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Dissecting Depositor Flight:
An Analysis of the Spring 2023 Bank Failures

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ABSTRACT

In the spring of 2023, Silicon Valley Bank, Signature Bank, and First Republic Bank all failed following broad-based deposit runs. We use granular data from the banks' core systems to study the types of deposits and depositors at each bank, the run rates of depositors, and the outflow rates of different types of deposits. Immediately preceding the runs, deposit composition varied meaningfully among the banks, likely reflecting their different business models. However, all three banks exhibited a concentration of deposits among a small number of large depositors. Consistent with public reports, we find that the runs were unprecedented in their size and speed. Most funds ran via wire transfer in the first few days. Our analysis shows that deposit insurance stabilized deposits and reduced depositors' propensity to run. Retail depositors that were fully insured generally did not run and, at certain times during the runs, had net *inflows* of deposits. Our findings also suggest that considerations other than deposit insurance coverage were also important: Top depositors were more likely to run, even after taking into consideration their insurance coverage and deposit types. In fact, many business depositors drew down balances in business operations accounts that were likely to be insured, such as residential mortgage servicing escrow accounts. This analysis provides unprecedented detail and insight into the largest and most severe bank runs that led to the second-, third-, and fourth-largest bank failures in U.S. history.

The views expressed are those of the authors and do not necessarily reflect the official positions of the Federal Deposit Insurance Corporation or the United States. The authors thank Smith Williams for disclosure review, Kathy Zeidler for editing, and Clayton Boyce and Lynne Montgomery for production assistance.

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INTRODUCTION

In the spring of 2023, Silicon Valley Bank (SVB), Signature Bank (SBNY), and First Republic Bank (FRB) all failed following broad-based deposit runs. In this study, we use operational data from the core deposit and wire systems of the three banks to identify the types of deposits and depositors at each bank, the run rates of depositors, and the outflow rates of different types of deposits.[1]

The FDIC collects these operational data when a bank fails. The data contain information on accounts, customers, balances, transactions, and wire transfer requests and executions for a period before and, sometimes, after failure. The granularity of these data provide insights into the behavior of depositors, types of deposits, and characteristics relevant to deposit stability that are not observable from regulatory data.[2] This granularity allows us to analyze the behavior of customized classes of deposits and depositors outside of regulatory reporting classifications.

In conducting the study, we first quantified deposits held by the three banks in the second half of 2022 and on March 6, 2023—the beginning of the week in which the runs started—classifying deposits by product and counterparty, to show trends and to benchmark our findings to data from bank Consolidated Reports of Condition and Income (Call Reports). We explored concentrations by type of deposit and in the share held by the largest 0.5 percent of depositors at each bank, hereafter top depositors.[3] We also estimated the uninsured share of deposits overall and the uninsured share of different types of deposits at each bank.[4]

We then examined the deposit runs at each bank. Much of our analysis focused on three weeks in spring 2023—March 6 to March 24—a period which encompasses the runs at all three banks, the failure of SVB and SBNY, and the establishment and operation of Silicon Valley Bridge Bank and Signature Bridge Bank.[5,6]

For all three banks, we examined run rates of depositors and outflow rates of different types of deposits, by counterparty, product, and deposit insurance coverage. We also compared run rates of top depositors relative to other depositors. And we examined the extent to which depositors that ran tended to leave residual balances in their accounts. For our analysis of FRB, we included the week of April 24, another period of elevated deposit outflows just before the bank was placed into receivership.

To better understand the timing of the runs, we examined wire transfer activity both to and from deposit accounts at the three banks. We looked at the time of submission and dollar amounts of wire transfer requests and when those requests were completed. We distinguished between outgoing wire transfer requests completed the day they were requested and those completed on a later date.

[1] We considered a depositor to have run on a specific day during the period March 7 to March 24 if the end-of-day balance for that depositor (including all deposit types in accounts owned by that depositor) was 25 percent or less of their March 6, 2023, balance. In other words, the depositor had withdrawn 75 percent or more of their March 6, 2023, balance. A depositor could run only once: the day in which their end-of-day balance first met the run threshold. We also examined run behavior at FRB during the period April 25 through April 28, and the reference balance used was each depositor's April 24 balance. We discuss our run definition in the section titled "Depositor Runs and Deposit Outflows."

[2] See Appendix B for more detailed information about the data used and constructed for these analyses.

[3] Top depositors on March 6, 2023, held between 39 percent and 62 percent of each bank's total domestic deposits. The dollar threshold for being a top depositor ranged from $6 million at FRB to $16 million at SBNY and $49 million at SVB. We discuss our definition of top depositor in the section titled "Deposit Concentration – Top Depositors."

[4] See Appendix A for a glossary of terms used in this study.

[5] Our analysis of SBNY focused on two weeks – from March 6 to March 17. On March 20, 2023, Flagstar Bank acquired substantially all the deposits of Signature Bridge Bank. See FDIC, "Subsidiary of New York Community Bancorp Inc., to Assume Deposits of Signature Bridge Bank, N.A., from the FDIC," press release, March 19, 2023.

[6] See the section titled "Timeline of Events" for details about the timing of events during the three-week period that we analyzed.

Given the speed of the run at all three banks, depositors may have found it easier to transfer their deposits to other banks if they already had an established relationship with another bank. So we looked at the share of outbound wires during the run that depositors sent to accounts to or from which they had sent or received wires in the previous six months.

Finally, we conducted regression analyses to identify and quantify the importance of depositor and deposit characteristics associated with depositor and deposit runoff between March 7 and March 17.

Our analyses focused on identifying the types of depositors and deposits that ran. We did not touch on many other questions of interest regarding the runs at these banks. In addition, banks other than these three had elevated deposit outflows in March 2023, but this study covers only the three banks that failed.[7] Our findings may not apply to other banks or periods.

KEY FINDINGS

DEPOSIT COMPOSITION AND CONCENTRATION

- In the period leading up to the runs, the composition of deposits differed among the three banks and likely reflected their different business models.[8] Business deposits were the largest type of deposit at all three banks, accounting for more than 90 percent of total domestic deposits at SVB and roughly half of total deposits at SBNY and FRB.[9]
- Third-party placed, pooled, passive escrow deposits (hereafter passive escrow deposits, such as mortgage servicing escrows and apartment security deposits) were a substantial share of total deposits at SBNY.[10] Third-party placed, pooled, active escrow deposits (hereafter active escrow deposits, which are primarily customer funds of investment companies and banking-as-a-service financial technology companies) were a significant share of total deposits at SBNY and FRB. Consumer deposits and trust deposits were sizable components of total deposits at FRB, consistent with the bank's focus on high-net-worth customers.[11] Other large deposit types were brokered certificates of deposit (CDs) at SBNY and FRB and government deposits at SBNY.
- We estimated that 94 percent of all domestic deposits at SVB were uninsured as of year-end 2022, which matches SVB's publicly reported uninsured deposit shares.

[7] See, for example, GAO, "Federal Deposit Insurance Act. Federal Agency Efforts to Identify and Mitigate Systemic Risk From The March 2023 Failures," January 2025, which refers to additional banks that experienced elevated deposit outflows.

[8] Our deposit types do not necessarily correspond to any regulatory definitions. We categorized deposits into different types that could behave differently when a bank is under stress. Considerations included whether the beneficial owner was the same as the account owner, whether the beneficial owner(s) could independently withdraw the funds on demand, deposit insurance categories, and the incentives for the account owner or beneficial owner to run.

[9] SBNY and FRB did not have foreign deposits.

[10] We differentiated between passive escrow deposits and active escrow deposits. The beneficial owner of the active escrow deposits most likely could unilaterally withdraw funds through the escrowing firm. The ability of the beneficial owner to withdraw funds on demand may mean that the third-party depositor has greater uncertainty with respect to its ability to forecast account inflows and outflows, compared with passive escrow deposits. The greater forecast uncertainty could result in active escrow deposits having different run behavior than passive escrow deposits. In addition, external events unrelated to the bank, such as loss of customer confidence in the third-party investment company or banking-as-a-service financial technology company, or downturns in asset markets, could lead to deposit outflows.

[11] Consumer deposits are deposits owned by consumers and held in nonretirement accounts. We distinguished between retirement and nonretirement consumer deposits because they are separate deposit insurance categories, and because retirement accounts have withdrawal restrictions. Consumer retirement deposits were a very small share of total deposits at all three banks.

- We estimated that at most, 74 percent of FRB's deposits were uninsured at year-end 2022, which is higher than the publicly reported uninsured deposit share of 68 percent. Trust deposits made up 14 percent of FRB's total deposits and, because we lacked information on beneficiaries, our deposit insurance estimate assumed one beneficiary per trust, meaning our estimate provided the upper bound for uninsured trust deposits and for all uninsured deposits at FRB.
- We estimated that at most, 76 percent of deposits at SBNY were uninsured at year-end 2022. This estimate, while still very high compared with other banks, is substantially lower than the publicly reported uninsured deposit share of 90 percent. Assumptions about the amount of pass-through deposit insurance coverage for passive escrow deposits explain the differences between our estimates of SBNY's uninsured deposits and the banks' publicly reported estimates.
- All three banks had significant concentrations of deposits among a relatively small number of depositors. Of the three banks, SBNY had the highest concentration of deposits on March 6, with top depositors holding 62 percent of total deposits. Top depositors held 39 percent of total deposits at SVB and 50 percent of total deposits at FRB.

DEPOSITOR RUNS AND DEPOSIT OUTFLOWS

- Between March 7 and March 17, each bank had one day in which net deposit outflows reached 20 percent or more of its March 6 deposits ***and*** 20 percent or more of its top depositors ran. This rate of deposit outflow is unprecedented.
    - At SVB, that occurred on Thursday, March 9, the day before it failed.
    - At SBNY, that occurred on Monday, March 13, the day after it failed and the systemic risk exception was invoked, during the first day of Signature Bridge Bank's operations.
    - At FRB, that occurred on Monday, March 13, after the failures of SVB and SBNY.
- Between March 7 and March 17, deposit outflows at all three banks were substantial, and the vast majority of top depositors ran.
    - SVB and SBNY lost more than half of their March 6 domestic deposits (60 percent at SVB and 58 percent at SBNY) and FRB lost 36 percent of its March 6 deposits (or 54 percent if excluding the $30 billion deposited by a consortium of 11 large banks on March 16).
    - Roughly two-thirds or more of each bank's top depositors ran (74 percent at SVB, 65 percent at SBNY, and 74 percent at FRB).
- The runs at SVB and SBNY between March 7 and March 17 were broad-based: 39 percent of SVB's total number of depositors ran, as did 22 percent of SBNY depositors.
- Much of the runs at all three banks occurred in just three business days. Between March 9 and March 14, SVB lost 50 percent of its March 6 domestic deposits.[12] And between March 10 and March 14, SBNY lost 50 percent of its March 6 deposits and FRB lost 47 percent.

[12] The period from March 9 to March 14 includes three business days because SVB was closed early in the day on March 10, likely preventing significant deposit outflows that day.

- During the week of March 20, relative to the previous weeks, deposit outflows slowed substantially and were not materially different at SVB and FRB. Relative to each bank's March 6 deposits:
  - SVB, in the second week of Silicon Valley Bridge Bank, lost almost 5 percent of its deposits.
  - Deposits at FRB, which was still a live, stressed bank, fell almost 6 percent.
- Top depositor runs also slowed substantially at SVB and FRB the week of March 20.
  - At SVB, an additional 5 percent of top depositors ran.
  - At FRB, an additional 10 percent of top depositors ran.
- The week of March 20 was the first week after Flagstar Bank's acquisition of most of SBNY's deposits. Following their acquisition, deposits from SBNY's core deposit systems tended to be more stable than those of FRB and SVB in terms of deposit outflows, top depositor run rates, and overall run rates.

RUN PROPENSITY OF TOP DEPOSITORS

- At all three banks, the share of depositors that ran increased with the deposit balance of the depositor measured using the percentile rank of that balance (hereafter, percentile rank of the depositor). There was a marked increase in the run rate for the largest depositors. The run rates of top depositors at all three banks were the highest of all depositors.
- Run behavior of top depositors appeared different from the behavior of smaller depositors. The increase in run rate between top depositors and depositors in the next lower percentile rank (0.5 percent to 1 percent) was statistically significant and was also substantially larger than the increase in run rate between other percentile categories, particularly at SVB and SBNY.
- At all three banks, nonfinancial company top depositors generally had significantly higher run rates than nonfinancial company depositors in the next lower percentile rank. We observed the same result for financial companies at SBNY.

OUTFLOW RATES – LARGEST DEPOSIT TYPES

- Business deposits, the largest type of deposit at all three banks, fell steeply between March 7 and March 17. SVB and SBNY lost about 60 percent of their March 6 business deposits during this period and FRB lost 36 percent (or 70 percent if the $30 billion consortium deposit was excluded). The vast majority of these business deposit outflows occurred in just three business days at each bank.
- Passive escrow deposits at SBNY fell 56 percent between March 7 and March 17. Most of the decline in these deposits occurred in just two business days.
- Active escrow deposits fell by the largest percentage among the primary deposit types at SBNY. In two business days, these deposits declined 83 percent. Between March 7 and March 17, these deposits fell 88 percent. At FRB, active escrow deposits also fell steeply but less than at SBNY. These deposits at FRB fell 52 percent between March 7 and March 17, with most of the decline occurring in just three business days.

- Between March 7 and March 17, more than half (56 percent) of consumer deposits left SBNY and about one-third (34 percent) left FRB. By the week ending March 24, these deposits fell an additional 6 percentage points at FRB.

OUTFLOWS OF DEPOSITS IN BUSINESS OPERATIONS ACCOUNTS

- Accounts that are not time deposits that hold business deposits and those that hold passive escrow deposits are expected to include balances used to support business operations such as receiving and making payments. We refer to these types of accounts as business operations accounts.
- We looked at the share of deposits withdrawn from business operations accounts by depositors that ran to see if these depositors left residual deposits in these accounts to meet in-process, anticipated, or scheduled transactions. We focused on large business depositors in this analysis.[13]
- At all three banks, depositors that ran between March 7 and March 17 mostly withdrew all or nearly all their balances in business operations accounts, leaving very little to no residual balances for business operations purposes. We observed this for business operations accounts that held business deposits and business operations accounts that held passive escrow deposits, and for both financial and nonfinancial firms. Our analysis focused on depositors that ran by March 17, which was a span of six business days from the first day of the run at each bank.

OUTFLOW RATES – INSURED AND UNINSURED DEPOSITS

- We separately studied the outflow rates of insured and uninsured funds. On Sunday March 12, the systemic risk exception was invoked, which extended full deposit insurance coverage to all deposits at SVB and SBNY. We estimated deposit insurance coverage following standard insurance rules, ignoring the impact of the systemic risk exception on ***de facto*** insurance coverage. Thus, we separately analyzed deposits that would have been uninsured in the absence of the systemic risk exception (hereafter uninsured deposits) and deposits that were insured even without the systemic risk exception (hereafter insured deposits) to show differences in their outflows.
- At all three banks, uninsured deposits fell steeply between March 7 and March 17. SVB lost 62 percent of its March 6 uninsured deposits during that period, SBNY lost 68 percent, and FRB lost 47 percent. However, if the $30 billion consortium deposit was excluded, FRB lost 71 percent of its March 6 uninsured deposits between March 7 and March 17, higher than both SVB and SBNY, with an additional 7 percentage point decline the following week.
- Total insured deposits also fell at all three banks between March 7 and March 17, though by materially lower proportions than uninsured deposits. SVB lost 30 percent of its insured deposit balances, while SBNY lost 33 percent and FRB lost just 7 percent.
- The outflow of insured balances largely reflected the run behavior of passive escrow deposits and the run behavior of depositors with uninsured balances. When depositors ran, they tended to withdraw all or almost all their money, even their insured balances. We therefore separately examined the behavior

[13] We defined a small business as an entity that had $1.5 million or less in business-related deposits on March 6. Business-related deposits were business deposits, employee-benefit plan deposits, active escrow deposits, and passive escrow deposits. Large business depositors were business depositors that did not meet the definition of a small business.

of deposit balances of retail depositors that were fully insured on March 6 and that would have less incentive to run. We refer to these deposits as fully insured retail deposits.[14]

- Fully insured retail deposits did not run, highlighting the stabilizing effects of deposit insurance. At SBNY, these balances increased between March 7 and March 13 and then returned to roughly the March 6 balance by March 17. At SVB, fully insured retail deposits increased 46 percentage points between March 7 and March 17. And at FRB, fully insured retail deposits increased 8 percentage points over the same period.

WIRE TRANSFER REQUESTS AND COMPLETIONS

- The vast majority of the net deposit outflows from all three banks during the runs left via wire transfer, primarily Fedwire and SWIFT.[15]
- At SVB, depositors submitted $54 billion in outbound wire transfers on Thursday, March 9, of which requests totaling $41 billion were completed that day and about $1 billion were canceled that day. The remaining $12.1 billion of wire transfer requests submitted on Thursday, March 9, were queued for execution on Friday, March 10. These wire requests were subsequently canceled. Almost three quarters (73 percent) of depositors whose wire requests were canceled on Friday, March 10, submitted new wires in the subsequent two days when Silicon Valley Bridge Bank was operational and the systemic risk exception was in place.
- The Federal Reserve reported that SVB expected $100 billion of deposit outflows on Friday, March 10.[16] The wire system data that we analyzed showed $12.1 billion of wires awaiting execution on the morning of Friday, March 10. SVB had many precursor systems through which wire requests were routed before execution, so additional wire requests may have been in the pipeline but not yet marked as ready for execution.
- At SBNY, depositors submitted $23.3 billion of outbound wire transfer requests on Friday, March 10, of which $2.2 billion did not go out that day. Depositors submitted additional wire requests over the weekend. By Sunday evening, March 12, up to $7.4 billion in wire requests were queued for execution on Monday, March 13, much of which was canceled by the bridge bank.[17] Depositors with canceled wire requests had to resubmit their requests. On Monday, March 13, outbound wire transfer requests totaling $19 billion were received by the wire system and completed the same day. This amount was significantly higher than the $7.4 billion in wires in the queue by Sunday. This suggests that at least $11 billion in outbound wire transfers were from depositors that submitted a request on Monday, March 13, to move money out of SBNY after the establishment of Signature Bridge Bank and invocation of the systemic risk exception.

[14] Fully insured retail deposits are defined as consumer deposits, consumer retirement deposits, business deposits of small businesses, deposits of estates, and trust deposits that were fully insured on March 6, 2023, and for which the depositor was also the beneficial owner. See footnote 13 for the definition of small business that we used.

[15] The Fedwire Funds Service, owned and operated by the Federal Reserve Banks, is a real-time gross settlement system used to transfer funds between participating U.S. financial institutions. SWIFT is a global cooperative, headquartered in Belgium, owned by its members and governed by central banks, including the National Bank of Belgium, the Federal Reserve, and the European Central Bank. SWIFT facilitates cross-border payments.

[16] See the Board of Governors of the Federal Reserve System, "Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank," April 28, 2023.

[17] The total volume of wire transfers queued by Sunday evening, March 12, varies by source. The reports on supervision of SBNY by the FDIC and the New York State Department of Financial Services describe $7.4 billion to $7.9 billion in pending wire requests. The wire system data show $2.2 billion of wires submitted on Friday, March 10, that did not go out but do not show the $5.3 billion of new wire requests submitted over the weekend. The wires submitted over the weekend may have been pending review in a precursor system.

REGRESSION ANALYSIS RESULTS

- Depositors with uninsured funds were much more likely to run on the banks, especially when more than 75 percent of their deposits were uninsured. This effect was larger than almost any other.
- Even after controlling for uninsured balances, top depositors at SVB and SBNY were much more likely to run.
- Business depositors with longer relationships at the bank that also owned multiple accounts were less likely to run, but this effect was substantially smaller than the effect of being uninsured or being a top depositor. These factors were less closely related to consumer depositors' decision to run.
- A depositor with term deposits had a lower predicted propensity to run, although all three banks had relatively few depositors with term deposits.
- Depositors associated with the digital asset sector and depositors with active escrow deposits were also more likely to run.

DEPOSIT COMPOSITION AND CONCENTRATION

TYPES OF DEPOSITS AT EACH BANK

In the period leading up to the runs, the composition of deposits differed among the three banks in line with differences in their business models.[18] Business deposits were the largest category of deposits at all three banks, however.

For this study, business deposits were deposits in accounts owned by businesses (including nonprofit organizations but not governmental entities) where the business was the beneficial owner of the funds. Account titles did not consistently describe the purpose of the funds (such as payroll account, investment account, reserve account) so we did not further differentiate the type of business deposit.

As of the end of third quarter 2022, year-end 2022, and on March 6, 2023, SVB had the most concentrated deposits of the three banks in terms of deposit type. Business deposits made up 94 to 95 percent of SVB's total deposits over the five-month period (Chart 1).

Business deposits were the largest single category of deposits at SBNY over the five-month period, accounting for roughly half of the bank's total deposits.[19] Passive escrow deposits (11 to 15 percent of total deposits) and active escrow deposits (13 to 15 percent of total deposits) were the next-largest types of deposits.

For this study, passive escrow deposits were deposits in accounts owned by a business (the third party) not affiliated with the bank and containing funds belonging to many different customers of the business in a single pooled account. We refer to these deposits as passive escrows because the beneficial owners of the funds generally could not withdraw their funds from the business (e.g., the apartment management company)

[18] At each bank, we excluded accounts owned by that bank for which the bank was also the beneficial owner of the funds, as these funds were not liabilities of the bank. Deposits for which a parent, subsidiary, or affiliate of one of these banks was the beneficial owner were included in the analyses. We also excluded foreign office deposits at SVB. SBNY and FRB did not have foreign office deposits.

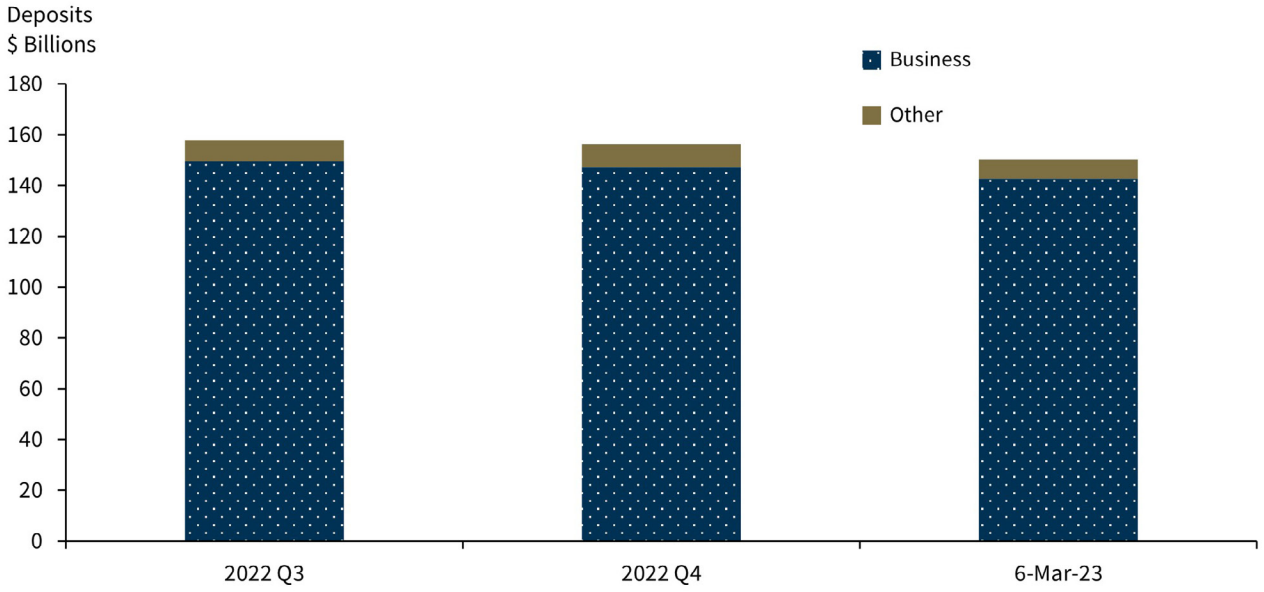
[19] The earliest deposit data collected by the FDIC from SBNY were from October 3, 2022. For the other two banks, data from September 30, 2022, were collected. In this discussion of SBNY's deposit composition and in Chart 3, we use data from October 3, 2022, to refer to third quarter 2022.

on demand. The beneficial owners of the funds therefore also could not (indirectly) withdraw their deposits from the bank on demand, although the third-party business that owned the account may have been able to do so.[20] Passive escrow deposits at SBNY were primarily mortgage servicing escrows, IRS Section 1031 exchanges,[21] apartment security deposits, and Interest on Lawyer's Trust Accounts (IOLTAs).[22]

For this study, active escrow deposits were deposits in accounts owned by a business not affiliated with the bank and containing funds belonging to multiple customers of that business in a single pooled account. For active escrow deposits, the beneficial owner of the funds more than likely had the ability to withdraw their money from the business (and therefore, indirectly, the bank) on demand. At SBNY these deposits were primarily customer funds of investment-related companies, including companies that facilitate investment in digital assets, and customer funds of banking-as-a-service financial technology firms. These deposits may have also included sweep accounts and other types of cash management accounts.[23]

CHART 1

Silicon Valley Bank - Domestic Deposit Composition



Note: Domestic deposit totals exclude funds for which the beneficial owner was Silicon Valley Bank.

[20] The beneficial owners of the funds in passive escrow accounts likely did not know which bank held their deposits.

[21] IRS Section 1031 addresses tax deferrals for like-kind exchanges of investment and business property. See 2023 instructions for Form 8824 at https://www.irs.gov/pub/irs-prior/i8824--2023.pdf. We classified these deposits as passive escrows because any withdrawals from a 1031 account must meet specific conditions to avoid creating a significant tax liability.

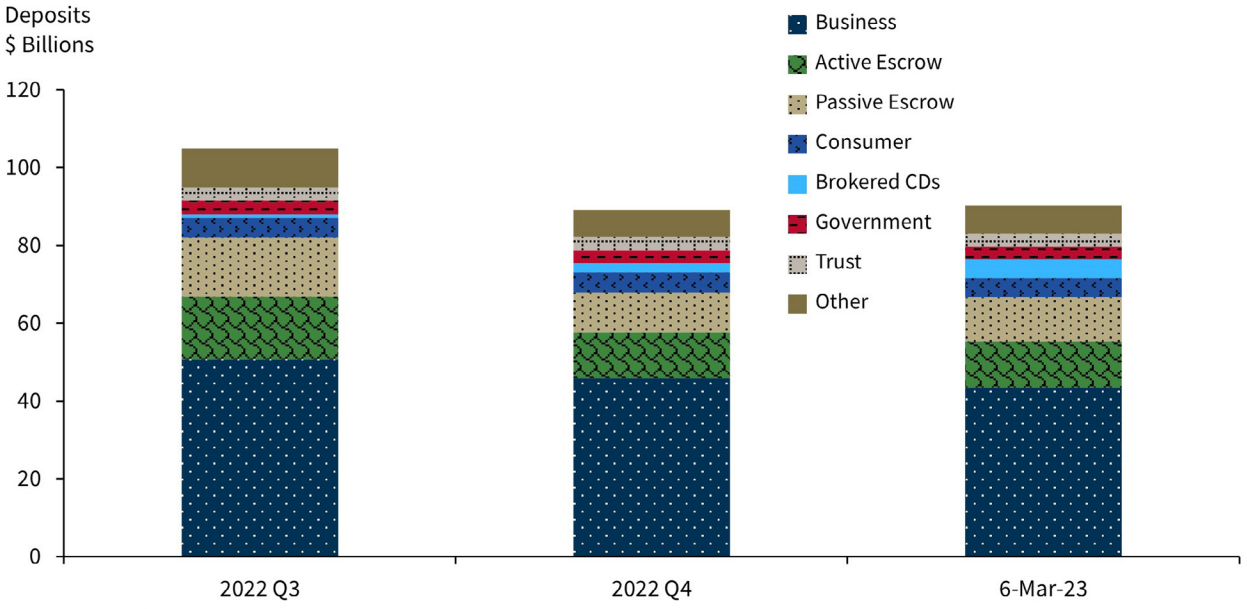
[22] IOLTAs generally hold attorney client funds that are nominal in amount or held for a short time. For information about IOLTAs, see the American Bar Association at https://www.americanbar.org/groups/interest_lawyers_trust_accounts/overview/.

[23] The ability of the beneficial owner of active escrow deposits to withdraw funds on demand may mean that the third-party depositor has greater uncertainty with respect to its ability to forecast account inflows and outflows, compared with passive escrow accounts where discretionary withdrawal is limited. The greater forecast uncertainty could result in active escrow deposits having different run behavior than passive escrow deposits. In addition, external events unrelated to the bank, such as loss of customer confidence in the third-party investment company or banking-as-a-service financial technology company, or downturns in asset markets could lead to deposit outflows.

Consumer deposits made up 5 to 6 percent of deposits at SBNY. Brokered CDs increased from less than 1 percent of the bank's total deposits at the end of third quarter 2022 to 5 percent of total deposits on March 6, 2023. Government deposits made up 3 to 4 percent of total deposits, and trust deposits accounted for another 3 to 4 percent of total deposits. Altogether, these seven types of deposits made up 90 to 92 percent of SBNY's deposits (Chart 2).

CHART 2

Signature Bank - Deposit Composition



Note: Deposit totals exclude funds for which the beneficial owner was Signature Bank.

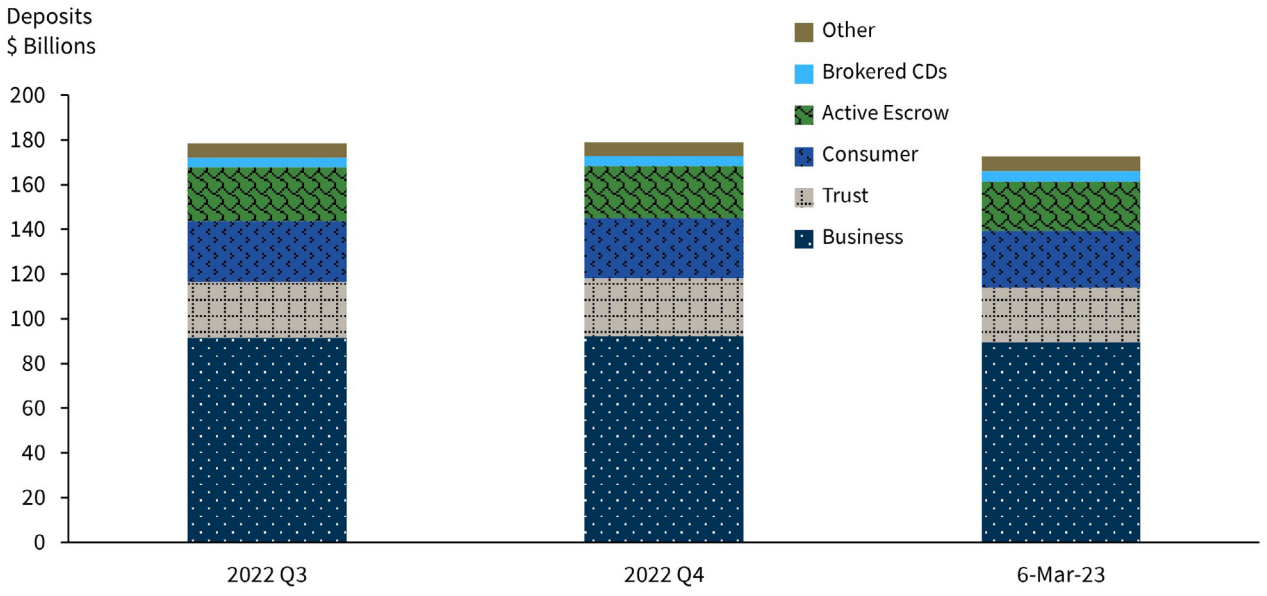
Business deposits were the largest single category of deposits at FRB over the same five-month period, making up half of the bank's total deposits. Consistent with a focus on high-net-worth customers, the next two largest types of deposits at FRB were consumer deposits (14 to 15 percent of total deposits) and trust deposits (14 percent of total deposits).

Active escrow deposits made up 12 to 14 percent of FRB's total deposits. At FRB, these deposits consisted of customer funds of investment-related companies, including money market funds, in sweep accounts or other types of cash management accounts.

Brokered CDs made up 2 to 3 percent of total deposits at FRB. Altogether, these five types of deposits constituted 97 percent of FRB's total deposits (Chart 3).

CHART 3

First Republic Bank - Deposit Composition



Note: Deposit totals exclude funds for which the beneficial owner was First Republic Bank.

ESTIMATED DEPOSIT INSURANCE COVERAGE OF THE LARGEST DEPOSIT TYPES

We estimated deposit insurance coverage by aggregating deposits across all accounts in the same deposit insurance category that were owned by the same depositor (identified by tax identification number).[24] For example, if bank records listed three accounts with the same business (identified by the same Employer Identification Number) as both the account owner and the beneficial owner of funds, then the balances in those three accounts were the amount of business deposits held by that business and any funds in excess of the deposit insurance limit of $250,000 were uninsured. If that same business also had an employee benefit plan account, which is a separate deposit insurance category, we estimated deposit insurance coverage separately for those deposits.[25]

We estimated deposit insurance coverage by depositor, type of deposit, and in aggregate for every day in our analysis period.[26] We did not have detailed information about beneficial owners (or beneficiaries of trusts) for several deposit types (trust deposits, active escrow deposits, passive escrow deposits, and brokered CDs). So we used assumptions that would yield the lowest possible estimate of deposit insurance coverage for these deposit types.

[24] We used the FDIC's "Financial Institution Employee's Guide to Deposit Insurance," updated April 1, 2024, as a reference for our estimation.

[25] See Appendix C for a detailed discussion of the methodology used to estimate deposit insurance coverage.

[26] To obtain the estimated uninsured share of each type of deposit, we summed the uninsured amounts of each deposit type across all depositors and divided by the total balance of that deposit type each day.

The following estimates of deposit insurance coverage are as of the end of third quarter 2022, at year-end 2022, and on March 6, 2023, for the most prevalent deposit types at the three banks:

- The vast majority of **business deposits** at all three banks were uninsured on these dates: 94 percent uninsured at SVB, 86 to 88 percent uninsured at SBNY, and 85 percent uninsured at FRB.
- At FRB, 41 to 46 percent of **consumer deposits** were uninsured, and more than two-thirds (69 to 70 percent) of **consumer deposits** were uninsured at SBNY.
- Almost all government deposits at SBNY (99 to 100 percent) were uninsured, although they were likely collateralized.
- At most, 60 to 64 percent of **trust deposits** were uninsured at FRB and 78 to 79 percent were uninsured at SBNY.
- Virtually all of **active escrow deposits** at SBNY (greater than 99.5 percent) and at FRB (99 percent) were uninsured.

In addition to the estimates above, we assumed that **passive** escrow deposits and **brokered CDs** were fully covered by pass-through deposit insurance.[27]

For deposit types for which we did not have detailed information about beneficial owners (or beneficiaries of trusts), we discuss below the assumptions that we made regarding deposit insurance coverage.

Trust deposits have $250,000 of deposit insurance per beneficiary, up to a maximum of $1.25 million for five or more beneficiaries. Our data did not reliably identify the number of beneficiaries related to trust accounts. So, we estimated deposit insurance coverage of trust deposits by assuming that each trust had only one beneficiary and therefore had only $250,000 of deposit insurance. Our estimates provide an upper bound on the uninsured share of trust deposits at each bank.

We assumed **brokered CDs** were fully insured with pass-through coverage because a primary attraction of brokered CDs, compared with alternatives such as money market funds, is deposit insurance coverage.

We assumed **passive escrow deposits** at SBNY were fully insured with pass-through coverage because 46 percent of the dollar volume of these deposits were mortgage servicing escrows (for principal and interest payments, and for taxes and insurance) and 15 percent were apartment security deposits and IOLTAs at year-end 2022. We considered it unlikely that a beneficial owner of any of these sources of funds would have had more than $250,000 in these commingled deposits.

At SBNY, 18 percent of the dollar volume of passive escrow deposits at year-end 2022 consisted of funds from IRS Section 1031 exchanges of investment and business property.[28] It is likely that a beneficial owner of these funds would have had more than $250,000 in these commingled deposits. We had no information about the beneficial owners, and for parsimony, assumed full coverage with pass-through insurance for these funds as we did with other sources of funds that made up passive escrow deposits at SBNY.

[27] This assumption implies that recordkeeping and titling requirements for obtaining pass-through deposit insurance coverage were met and that the total balance of each beneficial owner was below the deposit insurance threshold.

[28] IRS Section 1031 addresses tax deferrals for like-kind exchanges of investment and business property. See 2023 instructions for Form 8824 at https://www.irs.gov/pub/irs-prior/i8824--2023.pdf. We classified these deposits as passive escrows because any withdrawals from a 1031 account must meet specific conditions to avoid creating a significant tax liability.

As mentioned earlier, **active escrow deposits** at SBNY primarily consisted of customer funds of investment companies, including companies that facilitated investment in digital assets, and customer funds of banking-as-a-service financial technology companies. These deposits also may have included sweep accounts and other types of cash management accounts. Active escrow deposits at FRB primarily consisted of customer funds at investment companies, including sweep accounts and other types of cash management accounts. The FDIC's 2011 "Study on Core Deposits and Brokered Deposits" describes sweep processes commonly used by investment companies, in which customer funds were swept into a series of banks, and the balances at each bank were usually fully insured.[29]

We had no information on whether investment companies that facilitated investment in more specialized assets, including digital assets, used similar sweep processes that resulted in balances at each bank being fully insured. Nor did we have information on the customers of these investment firms and banking-as-a-service financial technology companies that might inform an estimate of deposit balances, such as whether they were primarily consumers or businesses. So, we estimated deposit insurance coverage of active escrow deposits by assuming that each account containing these types of pooled deposits had only one beneficial owner of funds and therefore had only $250,000 of deposit insurance. Our estimates provide an upper bound on the uninsured share of active escrow deposits at each bank.[30]

ESTIMATED SHARE OF UNINSURED DEPOSITS AT EACH BANK

For SVB, we estimated that 94 percent of all domestic deposits were uninsured as of the end of the third and fourth quarters of 2022, and on March 6, 2023. Our estimates match publicly reported uninsured deposit shares for SVB, including the uninsured deposit share computed using data from Call Reports for third and fourth quarter 2022.[31] About 35 percent of all SVB depositors had some uninsured deposits at the end of third quarter 2022. That share fell slightly to 34 percent by March 6, 2023.

For FRB, we estimated that, at most, 74 percent of all deposits were uninsured as of the end of third quarter 2022, 74 percent were uninsured as of year-end 2022, and 72 percent were uninsured on March 6, 2023. Our estimates are higher than the publicly reported uninsured deposit share of 68 percent for FRB at year-end 2022.[32] Trust deposits made up 14 percent of FRB's total deposits and, because we lacked information on beneficiaries, our deposit insurance estimate assumed one beneficiary per trust, meaning our estimate provided the upper bound for uninsured trust deposits and for all uninsured deposits at FRB.

About 13 percent of all FRB depositors had some uninsured deposits at the end of third quarter 2022, at year-end 2022, and on March 6, 2023.

For SBNY, we estimated that, at most, 76 percent of deposits were uninsured as of the end of third quarter 2022 and year-end 2022, and, at most, 72 percent were uninsured on March 6, 2023. Our estimates, while still

[29] See FDIC, "Study on Core Deposits and Brokered Deposits," July 8, 2011.

[30] It is extremely unlikely that every active escrow account contained funds from only one customer of the third party.

[31] Call Reports indicate that 93.9 percent of SVB's domestic deposits and 94.4 percent of its total deposits were uninsured on September 30, 2022, and on December 31, 2022. The Material Loss Review from the Office of the Inspector General of the Federal Reserve Board says that "as of year-end 2022, over 94 percent of SVB's total deposits were uninsured." The report from the California Department of Financial Protection and Innovation says that "as of year-end 2022, SVB had … uninsured deposits representing 93.8 percent of the bank's total deposits." The Federal Reserve's report on the supervision and regulation of SVB states that "as of year-end 2022, approximately 94 percent of SVBFG's total deposits were uninsured."

[32] The FDIC Office of Inspector General November 2023 Material Loss Review of First Republic Bank states that "uninsured deposits comprised 68 percent of First Republic's total deposits as of December 1, 2022." The FDIC's September 8, 2023, report on the supervision of First Republic Bank also states that 68 percent of FRB's deposits were uninsured. Call Reports indicate that 67.7 percent of FRB's deposits were uninsured at year-end 2022.

very high compared with other banks, are substantially lower than the publicly reported uninsured deposit share of 90 percent as of year-end 2022.[33]

In researching the source of this discrepancy, we reviewed a spreadsheet showing SBNY's computations of uninsured deposits for Call Report Schedule RC-O for year-end 2022. This spreadsheet contained detailed calculations of SBNY's estimates of uninsured deposits for individual depositors, which allowed us to compare the bank's method of estimating deposit insurance coverage with ours. The largest differences appeared to be in the treatment of deposits in accounts owned by third parties with pooled funds from their customers.

In the spreadsheet, SBNY summed all deposits in brokered CDs and estimated that only $250,000 of these deposits in brokered CDs were insured. SBNY's computation assumed that there was only one beneficial owner of the funds in all the brokered CDs. In contrast, as we discussed earlier, we treated brokered CDs as fully insured with pass-through insurance coverage. The insurance assumptions for brokered deposits used by SBNY are inconsistent with our understanding of the brokered deposit market. However, we did not observe—and SBNY also likely did not observe—the number of beneficial owners, nor that all titling and recordkeeping requirements necessary for pass-through insurance were met. Brokered CDs accounted for almost 3 percent of total deposits at SBNY at year-end 2022.

In the spreadsheet, SBNY generally summed all deposits owned by the same depositor, regardless of type of deposit, and estimated that $250,000 of the total was insured. For example, in its records, a major residential mortgage servicer with business deposits and multiple large passive escrow accounts was listed as having total deposits equal to the sum of both types of deposits. SBNY's uninsured deposits as reported in schedule RC-O reflected total insured deposits of $250,000 for this depositor. SBNY's methodology assumed that the mortgage servicer was the single beneficial owner of the funds in every one of the large accounts holding commingled funds of its customers.

By our methodology, we gave the business deposits $250,000 of deposit insurance coverage and assumed that the passive escrow deposits were fully insured by pass-through deposit insurance coverage, resulting in the mortgage servicer having a much higher share of insured deposits. However, we did not observe—and SBNY also likely did not observe—the number of beneficial owners, nor that all titling and recordkeeping requirements necessary for pass-through insurance were met.

If we summed all deposits at SBNY by depositor, regardless of type or deposit insurance category, and assumed that $250,000 was insured for each depositor, our estimate of uninsured deposits for year-end 2022 would be 90 percent of total deposits. This matches the publicly reported uninsured share of deposits for that date and SBNY's calculations in the spreadsheet. This exercise suggests that an estimate of 90 percent uninsured deposits at SBNY at year-end 2022 requires generally assuming minimal pass-through deposit insurance coverage for pooled escrow and custodial deposits. Our assumptions about pass-through insurance coverage of pooled escrow and custodial deposits and estimate of at most 72 percent uninsured on March 6 are broadly consistent with the FDIC's estimate that 67 percent of SBNY deposits were uninsured at failure.[34]

Twenty percent of all depositors had some uninsured deposits at SBNY as of the end of third quarter 2022. This share fell slightly to 19 percent by March 6, 2023.

[33] The reports on supervision of Signature Bank by the FDIC and the New York State Department of Financial Services both state that 90 percent of total deposits were uninsured on December 31, 2022, as does the FDIC's Material Loss Review.

[34] See FDIC Final Rule on Special Assessment Pursuant to Systemic Risk Determination, November 29, 2023.

DEPOSIT CONCENTRATION – TOP DEPOSITORS

In this study, we defined a depositor as an account owner with associated deposits equal to the total deposits in all accounts they own.[35] We ranked depositors at each bank by their total deposits as of March 6, 2023, and designated the top 0.5 percent of depositors at each bank as top depositors.[36] We separately ranked FRB depositors using their April 24, 2023, balance to designate top depositors at FRB in April 2023.

We selected the top 0.5 percent threshold for the top depositor designation because, while run rates generally increased with size of deposits, the run rate of the top 0.5 percent of depositors tended to be notably higher, particularly at SVB and SBNY. We discuss these run rates later in this study.

The dollar threshold for being a top depositor varied across the three banks. At SVB, the top depositors each had at least $49 million in deposits. At SBNY, the top depositors each had at least $16 million in deposits. And at FRB, the top depositors each had at least $6 million in deposits. This dollar threshold fell to $2 million at FRB during the last week of April 2023.

The top depositors at all three banks held a large share of each bank's total deposits. The fewer than 500 top depositors at SVB held 38 percent of total domestic deposits. At SBNY, the fewer than 600 top depositors held 62 percent of total deposits. At FRB, the roughly 3,000 top depositors held 50 percent of total deposits on March 6 and 35 percent of total deposits on April 24.

TIMELINE OF EVENTS

All three banks had sizable deposit outflows that began during the week of March 6, 2023, but the timing of their subsequent failure and then acquisition varied. These events are summarized in Table 1.

Depositors began running on SVB on Thursday, March 9, and regulators closed the bank during business hours on the morning of Friday, March 10. Also on that Friday, deposit runs began at SBNY and FRB, accelerating significantly after 3 p.m. On Sunday, March 12, SBNY failed; the systemic risk exception was invoked, fully protecting all depositors of the two failed banks, SVB and SBNY;[37] and the Federal Reserve announced the Bank Term Funding Program to provide emergency liquidity to the banking system. FDIC also established bridge banks for both SVB and SBNY; the bridge banks opened for business the following morning, Monday, March 13.

On Thursday, March 16, seeking to restore market confidence, a consortium of 11 large banks deposited $30 billion in FRB. On Monday, March 20, Flagstar Bank acquired substantially all the deposits of Signature Bridge Bank while Silicon Valley Bridge Bank continued to operate until Monday, March 27, when it was acquired

[35] This definition of depositor aligns with the notion of ability to withdraw deposits and close accounts during a run. In many cases, the depositor was the beneficial owner of the deposits they controlled. In some cases, particularly for joint consumer accounts, multiple depositors and beneficial owners may have been associated with the same deposit account. For custodial accounts, the depositor was not the beneficial owner of the deposits but had control of the deposits.

[36] For the top depositor designation, we summed all deposits of a depositor regardless of the type of deposit. For example, if a business had a business account with $500,000 and a passive escrow account with $30,000, then that depositor had a total of $530,000 in deposits at the bank.

[37] See Joint Statement by the Department of the Treasury, Federal Reserve, and FDIC, March 12, 2023.

TABLE 1
Timeline of Key Events

Date	Event
Thursday, March 9	Run begins at SVB.
Friday, March 10	SVB fails. Runs begin at SBNY and FRB.
Sunday, March 12	SBNY fails. Systemic risk exception announced for SVB and SBNY. Federal Reserve announces Bank Term Funding Program.
Monday, March 13	Silicon Valley Bridge Bank opens. Signature Bridge Bank opens.
Thursday, March 16	Consortium of 11 banks deposit $30B at FRB.
Monday, March 20	Flagstar Bank acquires substantially all the deposits of Signature Bridge Bank.
Monday, March 27	First-Citizens Bank & Trust Company acquires Silicon Valley Bridge Bank.
Monday, May 1	FRB is closed and immediately acquired by JPMorgan Chase Bank.

by First-Citizens Bank & Trust Company.[38] FRB operated until May 1 when it was closed by regulators and immediately acquired by JPMorgan Chase Bank.[39]

DEPOSITOR RUNS AND DEPOSIT OUTFLOWS

We studied depositor runs and outflows of deposits before and, in the case of SVB and SBNY, after failure. We used deposit balances on March 6, the Monday of the week in which the runs started, as our starting point for all three banks. We focused on the three weeks between March 6 to March 24.

For SVB, these three weeks included four days as an operating bank; closure by regulators soon after the bank opened on Friday, March 10; and two additional weeks as a bridge bank. For SBNY, our analysis spanned the period March 6 to March 17, which included one week in which SBNY was an operating bank and one week of Signature Bridge Bank's operations. FRB was an operating bank under stress during the three weeks. Our analysis of FRB included the week of April 24, another period of elevated deposit outflows at FRB just before the bank was placed into receivership.

To analyze the runs, we focused on two complementary measures of depositor withdrawal behavior: deposit balances (both in aggregate and by deposit type and estimated deposit insurance coverage) and indicators of how many depositors ran. We considered a depositor to have run on a specific day during the period March 7 to March 24 if the end-of-day balance for that depositor (including all deposit types in accounts owned by that depositor) was 25 percent or less of their March 6, 2023, balance.[40] In other words, the depositor had withdrawn 75 percent or more of their March 6, 2023, balance. A depositor could run only once: the day in which their end-of-day balance first met the run threshold. For FRB, we considered a depositor to have run on

[38] See FDIC, "First–Citizens Bank & Trust Company, Raleigh, NC, to Assume All Deposits and Loans of Silicon Valley Bridge Bank, N.A., from the FDIC," press release, March 26, 2023.

[39] See FDIC, "JPMorgan Chase Bank, National Association, Columbus, Ohio Assumes All the Deposits of First Republic Bank, San Francisco, California," press release, May 1, 2023.

[40] We selected the 25 percent threshold for the remaining balance to reduce the possibility of false positives. We considered using a 50 percent run threshold, but smaller depositors with more variation in their end-of-day balances would have a higher likelihood of being considered to have run when they did not. The 25 percent threshold is consistent with academic literature on bank runs, such as Iyer and Puri (2012).

a specific day between April 25 and April 28 if the end-of-day balance for that depositor (including all deposit types in accounts owned by that depositor) was 25 percent or less of their April 24, 2023, balance.

Table 2 shows total deposits and the total number of depositors on March 6, 2023, at all three banks. It also shows total end-of-day deposits and the share of all depositors and share of top depositors that ran each day from March 7 to March 24.

DEPOSITOR RUNS AND DEPOSIT OUTFLOWS: MARCH 7 TO MARCH 17, 2023

Between March 7 and March 17, each bank had one day in which net deposit outflows reached 20 percent or more of its March 6 deposits ***and*** 20 percent or more of its top depositors ran.

For SVB, that day was Thursday, March 9, the day before it failed, when roughly 23 percent of its top depositors ran and there was a net outflow of $30.2 billion of domestic deposits, which was a loss of about 20 percent of its March 6 domestic deposits.[41] The bank was closed early in the day on Friday, March 10, likely preventing significant deposit outflows that day.

Arguably, SVB had a second day that met both these criteria—on Monday, March 13, after its failure and the invocation of the systemic risk exception and during the first day of the bridge bank's operation. An additional 22 percent of its top depositors ran that day. The net deposit outflow of $21.5 billion that day, which was 14 percent of SVB's March 6 balance, included inflows of $11.2 billion of previously off-balance sheet funds that were part of one of SVB's automatic sweep programs.[42] Without these inflows, deposit balances on Monday, March 13, would have declined by about $32.7 billion, which was 22 percent of its March 6 balance. Substantial deposit outflows continued Tuesday, March 14, before tapering off in the following days.

SBNY lost 22 percent of its March 6 deposits on Monday, March 13, after its failure and the invocation of the systemic risk exception, the first day of its bridge bank, and the day in which 23 percent of its top depositors ran. SBNY also had net deposit outflows of almost 21 percent on Friday, March 10, the last business day before it failed on Sunday, March 12.

FRB had net deposit outflows of 23 percent of its March 6 deposits on Monday, March 13, a day in which 30 percent of its top depositors ran.

Losing 20 percent or more of deposits in one day is unprecedented. According to Rose (2023b), Continental Illinois, which at the time of its failure in 1984 was the eighth-largest bank, lost 30 percent of its deposits in seven business days. And Washington Mutual, the sixth-largest bank at the time of its failure in 2008, lost 10 percent of its deposits in 12 business days.

[41] The "Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank" states that deposit outflows on Thursday, March 9, exceeded $40 billion. While net deposit outflow that day was $30.2 billion, there was $41 billion in outbound wire transfers, which closely matches the number in the Federal Reserve report. That same day, SVB had $12.8 billion in inbound wire transfers, a large share of which were end-of-day sweeps from money market funds to depositor accounts.

[42] Roughly 4,000 deposit accounts at SVB were enrolled in a sweep program in which funds were automatically swept from the repurchase agreement (hereafter repo) market into the deposit account in the morning, the depositor conducted business with the deposit account throughout the day, and all funds present at the end of the day were swept back out to the repo market before close of business. Funds swept into the repo market existed as deposits on SVB's balance sheet only during the day so they did not appear in end-of-day balances before Monday, March 13. Funds swept from the repo market into the linked deposit accounts in the morning of Monday, March 13, totaled $12.9 billion. The sweep of funds from the deposit accounts to the repo market ceased that day. Depositors affected by this sweep program change immediately began withdrawing funds from the accounts. By the end of the day, depositors had drawn these accounts down to $11.2 billion and to $6.5 billion by the end of Friday, March 17.

TABLE 2
Deposit Outflow and Depositor Runs, March 7 to March 24, 2023

	Mon 6-Mar-23		Tue 7-Mar	Wed 8-Mar	Thu 9-Mar	Fri 10-Mar	Mon 13-Mar	Tue 14-Mar	Wed 15-Mar	Thu 16-Mar	Fri 17-Mar	Cumulative from 6-Mar	Mon 20-Mar	Tue 21-Mar	Wed 22-Mar	Thu 23-Mar	Fri 24-Mar	Cumulative from 6-Mar
SILICON VALLEY BANK																		
Total Domestic Deposits ($B)	**$150.3**		$150.6	$150.7	$120.5	$120.1	$98.6	$75.7	$68.9	$62.9	$60.4	–$90.0	$58.1	$56.7	$56.3	$55.4	$53.6	–$96.7
Daily Balance Change as a Pct of 6-Mar-23 Balance			0.2%	0.1%	–20.1%	–0.2%	–14.4%	–15.2%	–4.5%	–4.0%	–1.7%	–59.8%	–1.5%	–0.9%	–0.3%	–0.5%	–1.2%	–64.3%
No. Depositors with Positive Balance	**80,000**	**All** Depositors: Share That Ran	1%	1%	7%	2%	13%	9%	3%	2%	1%	39%	2%	1%	1%	1%	1%	44%
Top Depositors = Ranked in Top 0.5% by Total Deposits on 6-Mar-23	**400**	**Top** Depositors: Share That Ran	1%	1%	23%	2%	22%	15%	5%	4%	2%	74%	1%	1%	1%	1%	1%	77%
SIGNATURE BANK																		
Total Deposits ($B)	**$90.2**		$90.5	$90.4	$90.0	$71.3	$51.1	$44.6	$42.5	$40.5	$38.1	–$52.1						
Daily Balance Change as a Pct of 6-Mar-23 Balance			0.3%	–0.1%	–0.5%	–20.7%	–22.4%	–7.1%	–2.4%	–2.2%	–2.7%	–57.8%						
No. Depositors with Positive Balance	**109,000**	**All** Depositors: Share That Ran	1%	1%	1%	3%	7%	4%	3%	2%	1%	22%						
Top Depositors = Ranked in Top 0.5% by Total Deposits on 6-Mar-23	**600**	**Top** Depositors: Share That Ran	1%	1%	1%	19%	23%	11%	5%	2%	2%	65%						
FIRST REPUBLIC BANK																		
Total Deposits ($B)	**$172.6**		$172.2	$173.4	$175.6	$147.8	$107.3	$94.3	$88.5	$113.8	$110.2	–$62.4	$106.1	$104.2	$103.3	$101.9	$100.8	–$71.8
Daily Balance Change as a Pct of 6-Mar-23 Balance			–0.2%	0.7%	1.3%	–16.1%	–23.5%	–7.5%	–3.4%	14.7%	–2.1%	–36.2%	–2.4%	–1.1%	–0.5%	–0.8%	–0.6%	–41.6%
Total Deposits ($B) Without $30B	**$172.6**		$172.2	$173.4	$175.6	$147.8	$107.3	$94.3	$88.5	$83.8	$80.2	–$92.4	$76.1	$74.2	$73.3	$71.9	$70.8	–$101.8
Daily Balance Change as a Pct of 6-Mar-23 Balance			–0.2%	0.7%	1.3%	–16.1%	–23.5%	–7.5%	–3.4%	–2.7%	–2.1%	–53.5%	–2.4%	–1.1%	–0.5%	–0.8%	–0.6%	–59.0%
No. Depositors with Positive Balance	**599,000**	**All** Depositors: Share That Ran	1%	1%	0%	2%	3%	1%	1%	1%	1%	10%	1%	1%	1%	0%	0%	13%
Top Depositors = Ranked in Top 0.5% by Total Deposits on 6-Mar-23	**3,000**	**Top** Depositors: Share That Ran	1%	1%	1%	21%	30%	8%	4%	4%	4%	74%	3%	2%	2%	1%	1%	83%

Note: Depositor counts are rounded to reduce risk of disclosure of private information. A depositor is defined to have run on a specific day if the end-of-day balance for that depositor (including all deposit types in accounts owned by that depositor) was 25 percent or less of their March 6, 2023, balance. Silicon Valley Bank statistics from March 13 to March 23 are from its bridge bank. Signature Bank statistics from March 13 to March 17 are from its bridge bank. Highlighted cells indicate deposit outflows of at least 20 percent of the bank's March 6 balance and indicate when 20 percent or more of top depositors ran. First Republic Bank statistics show balances with and without the $30 billion deposit from the consortium of 11 large banks.

In total, between March 7 and March 17, SVB lost 60 percent of its March 6 domestic deposits, and 39 percent of all depositors and 74 percent of top depositors ran. Between March 7 and March 17, SBNY lost 58 percent of its March 6 deposits, and 22 percent of all depositors and 65 percent of top depositors ran. In the same period, FRB lost 36 percent of its March 6 deposits, and 10 percent of all depositors and 74 percent of its top depositors ran. If the $30 billion consortium deposit was excluded, FRB lost 54 percent of its March 6 deposits between March 7 and March 17.

Much of the runs at all three banks occurred in just three business days. Between March 9 and March 14, SVB lost 50 percent of its March 6 domestic deposits.[43] And between March 10 and March 14, SBNY lost 50 percent of its March 6 deposits and FRB lost 47 percent.

DEPOSITOR RUNS AND DEPOSIT OUTFLOWS: MARCH 20 TO MARCH 24, 2023

The week of March 20 was the second and final week of Silicon Valley Bridge Bank. FRB continued to operate and had not yet been put into receivership. At both banks, deposit outflows slowed substantially and were not materially different between the two banks. SVB lost almost 5 percent of its March 6 deposits and FRB lost almost 6 percent of its March 6 deposits.

Top depositor runs also slowed substantially at both banks. During this week, an additional 5 percent of top depositors ran at SVB and an additional 9 percent of top depositors ran at FRB. Among all depositors, an additional 5 percent ran at SVB while 3 percent of all depositors ran at FRB.

This week was the first week after Flagstar Bank's acquisition of most of SBNY's deposits. Following their acquisition, deposits from SBNY's core deposit systems tended to be more stable than those of FRB and SVB in terms of deposit outflows, top depositor run rates, and overall run rates.

DEPOSITOR RUNS AND DEPOSIT OUTFLOWS: APRIL 24 TO APRIL 28, 2023

Table 3 shows deposits at FRB the week of April 24, 2023, the week before it failed. Deposit outflows from FRB that week were substantially lower than outflows the first two weeks in March: FRB lost about 13 percent of its April 24 deposits by the end of the week.[44] But its April 24 deposits were only about 58 percent of its March 6 deposits. Thirty-nine percent of its top depositors ran the week before the bank failed.

[43] The period from March 9 to March 14 includes three business days because SVB was closed early in the day on March 10, likely preventing significant deposit outflows that day.

[44] If the $30 billion consortium deposit was excluded, FRB lost 19 percent of its April 24 deposits by the end of the week.

TABLE 3
Deposit Outflows and Depositor Runs, April 25 to April 28, 2023

	Mon 24-Apr		Tue 25-Apr	Wed 26-Apr	Thu 27-Apr	Fri 28-Apr	Cumulative from 24-Apr
FIRST REPUBLIC BANK							
Total Deposits ($B)	**$99.6**		$98.0	$94.4	$90.4	$86.3	-$13.3
Daily Balance Change as a Pct of 24-Apr-23 Balance			-1.6%	-3.6%	-4.0%	-4.1%	-13.4%
Total Deposits ($B) Without $30B	**$69.6**		$68.0	$64.4	$60.4	$56.3	-$13.3
Daily Balance Change as a Pct of 24-Apr-23 Balance			-2.3%	-5.2%	-5.7%	-5.9%	-19.1%
No. Depositors with Positive Balance	**599,000**	**All** Depositors: Share That Ran	1%	1%	1%	2%	5%
Top Depositors = Ranked in Top 0.5% by Total Deposits on 24-Apr-23	**3,000**	**Top** Depositors: Share That Ran	6%	11%	9%	14%	39%

Note: Depositor counts are rounded to reduce risk of disclosure of private information. A depositor is defined to have run on a specific day if the end-of-day balance for that depositor (including all deposit types in accounts owned by that depositor) was 25 percent or less of their April 24, 2023, balance. Deposit totals are reported with and without the $30 billion deposit from the consortium of 11 large banks.

RUN PROPENSITY OF TOP DEPOSITORS

At all three banks, between March 7 and March 17, top depositors were substantially more likely to run than the average depositor.[45] Top depositors were also much quicker to run. In the span of three business days, roughly half of top depositors had run at SVB and SBNY.[46] At FRB, roughly half of top depositors had run in two business days.

In this section, we explore the relationship between run propensity and a depositor's March 6 balance, measured using the percentile rank of that balance (hereafter, percentile rank of the depositor). Charts 4 through 6 show the run rates for all depositors by their percentile rank at each bank. At all three banks, the share of depositors that ran increased with the percentile rank of the depositor, although not always at a constant rate, and the run rate for the largest depositors was substantially higher.

At SVB, the run rate steadily increased by the percentile rank of the depositor, with a sharper rate of increase among depositors that had run by March 17 than depositors that ran by March 10. For both dates, depositors in the top percentile, with the largest deposit balances, had a noticeably higher run rate. These depositors also held almost half of the bank's total deposits.

At SBNY, the run rate by March 10 was relatively constant until about the 90th percentile and then increased more sharply for depositors in the top percentile. The run rate by March 17 was also relatively constant until about the 75th percentile, increased again at about the 90th percentile, and increased more sharply for depositors in the top percentile. These depositors held more than 60 percent of the bank's total deposits.

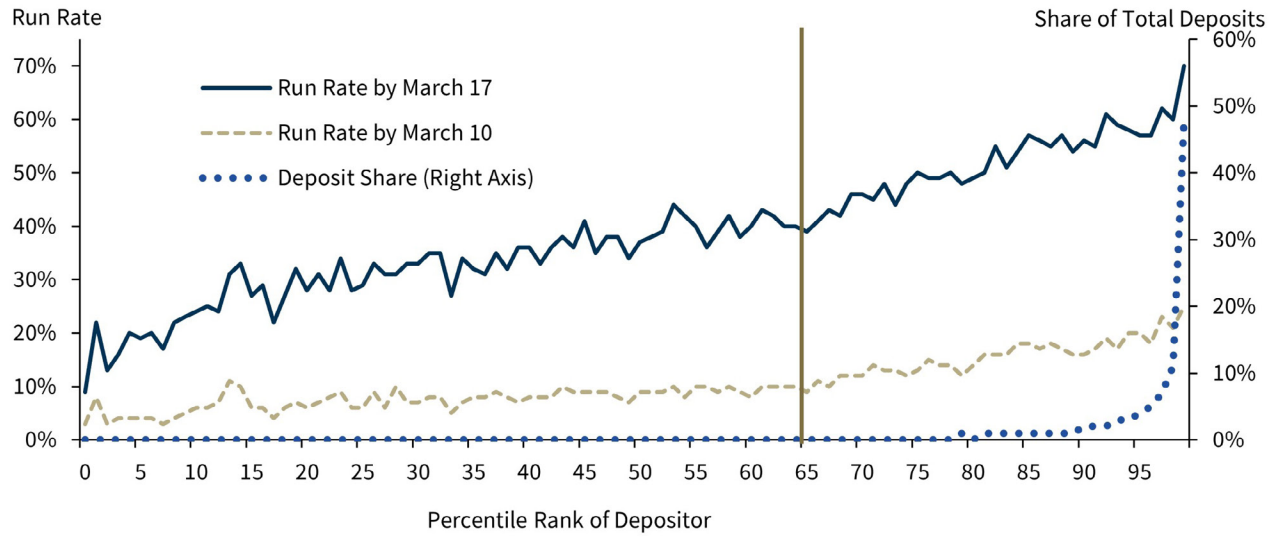
At FRB, the run rates by March 10 and March 17 were relatively constant until about the 90th percentile, then increased more sharply at about the 95th percentile and even more sharply at the 99th percentile. Depositors in the top percentile held about 50 percent of the bank's total deposits.

[45] In regression analyses, this remains true after controlling for a variety of factors including share of uninsured deposits.

[46] For SVB, the three business days were Thursday, March 9, to Tuesday, March 14. Because SVB was closed early in the day on Friday, March 10, we did not count it as a business day. At SBNY, the three business days were Friday, March 10 to Tuesday, March 14.

CHART 4

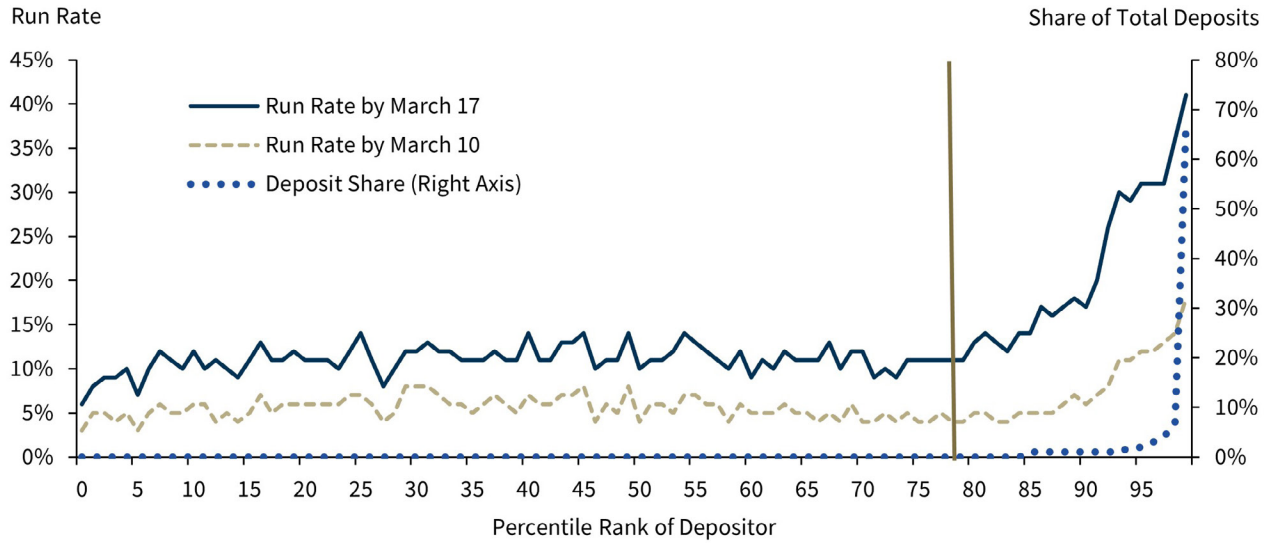
Silicon Valley Bank - Run Rate and Share of Total Deposits by Percentile Rank of Depositor



Note: Depositors were ranked by their March 6, 2023, balance. Vertical bar indicates the percentile rank of a depositor with $250,000. Depositors with balances higher than $250,000 could have been insured by pass-through insurance coverage or by holding deposits in different deposit insurance categories (i.e. different ownership rights and capacities).

CHART 5

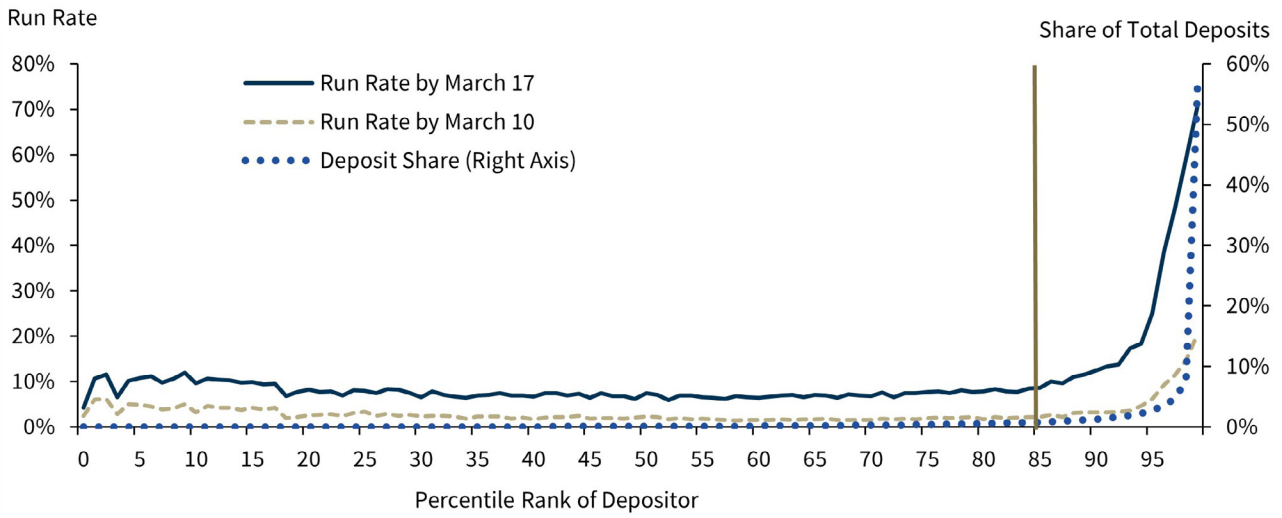
Signature Bank - Run Rate and Share of Total Deposits by Percentile Rank of Depositor



Note: Depositors were ranked by their March 6, 2023, balance. Vertical bar indicates the percentile rank of a depositor with $250,000. Depositors with balances higher than $250,000 could have been insured by pass-through insurance coverage or by holding deposits in different deposit insurance categories (i.e. different ownership rights and capacities).

CHART 6

First Republic Bank - Run Rate and Share of Total Deposits by Percentile Rank of Depositor



Note: Depositors were ranked by their March 6, 2023, balance. Vertical bar indicates the percentile rank of a depositor with $250,000. Depositors with balances higher than $250,000 could have been insured by pass-through insurance coverage or by holding deposits in different deposit insurance categories (i.e. different ownership rights and capacities).

These results highlight the importance of the largest depositors to the overall liquidity risk profile of the banks' deposit bases. Although the largest depositors were few in number, they controlled large shares of the banks' deposits and were especially likely to run. With this in mind, we further split the top 1 percent of depositors at each bank into two groups to see if run rates differed for the top 0.5 percent of depositors compared with the next lower 0.5 percent of depositors.

The top panel of Table 4 shows that at all three banks, the run rates by March 10, March 13, and March 17 were higher for top depositors than for depositors in the next lower percentile rank (0.5 percent to 1 percent).[47]

The middle panel of Table 4 compares the run rate of depositors in a percentile rank with the run rate of depositors in the next lower percentile rank, with differences reported in percentage points. For example, as of March 10, the difference in run rate between the top depositors at SBNY and depositors in the next lower percentile rank (0.5 percent to 1 percent) was 8 percentage points (22 percent minus 14 percent).

The bottom panel of the table compares the run rate of depositors in a percentile rank with the run rate of depositors in the next lower percentile rank, with differences in run rates reported in percentages. For example, as of March 10, the run rate of the top depositors at SBNY was 55 percent higher than the run rate of depositors in the next lower percentile rank (0.5 percent to 1 percent).

The shaded cells in the bottom two panels of Table 4 show the largest differences. At SBNY and for depositors that ran by March 10 and March 17 at SVB, the increase in the run rate of top depositors compared with the depositors in the next lower percentile rank were also substantially larger than all of the other differences in

[47] Differences in run rates between top depositors and depositors in the next lower percentile rank were statistically significant for all three dates in March at all three banks. Differences were also statistically significant for the runs in April at FRB.

run rates in the table.[48] These results suggest a substantive difference in the run behavior of top depositors, even when compared to depositors in the next lower percentile rank. While the run rates in Table 4 are unconditional, the results are qualitatively similar when we control for the types of deposits that a depositor held, including passive escrow, active escrow, business, government, and trust deposits.

TABLE 4
Unconditional Run Rates of the Largest Depositors by Percentile Ranking

	SVB			SBNY			FRB March			FRB April
RUN RATES OF DEPOSITORS THAT RAN BY MARCH 10, MARCH 13, MARCH 17, AND APRIL 28 (FRB)										
	10-Mar	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**28-Apr**
Percentile Rank										
<= 0.5 (Top Depositors)	27%	49%	74%	22%	45%	65%	23%	54%	74%	40%
0.5 - 1.0	23%	44%	65%	14%	38%	55%	18%	47%	68%	24%
1.0 - 2.0	21%	39%	60%	14%	36%	55%	15%	40%	59%	13%
2.0 - 3.0	23%	42%	62%	13%	31%	52%	11%	31%	48%	10%
Bottom 20	6%	12%	23%	12%	31%	52%	4%	6%	10%	7%
DIFFERENCE (PERCENTAGE POINTS) FROM NEXT LOWER PERCENTILE RANK										
	10-Mar	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**28-Apr**
Percentile Rank										
<= 0.5 (Top Depositors)	4%	5%	9%	8%	8%	9%	5%	6%	6%	15%
0.5 - 1.0	2%	4%	5%	0%	2%	1%	3%	8%	9%	11%
1.0 - 2.0	-2%	-3%	-1%	1%	4%	3%	3%	9%	11%	4%
DIFFERENCE (PERCENT) FROM NEXT LOWER PERCENTILE RANK										
	10-Mar	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**28-Apr**
Percentile Rank										
<= 0.5 (Top Depositors)	16%	12%	14%	55%	20%	17%	29%	13%	9%	62%
0.5 - 1.0	9%	11%	8%	-1%	6%	1%	23%	19%	15%	85%
1.0 - 2.0	-9%	-6%	-2%	11%	13%	5%	28%	27%	23%	36%

Note: Depositors were ranked by their March 6, 2023, balance. A depositor could only run once, so depositors that ran by March 10 are included in the share of depositors that ran by March 13 and the share of depositors that ran by March 17. FRB depositors were also ranked by their April 24, 2023, balance.

One possible reason that the top depositors at all three banks had a significantly higher run rate than depositors in the next lower percentile rank could be because financial companies made up a higher proportion of the top depositors than depositors in the next lower percentile rank, and financial companies have been shown to be more likely than nonfinancial companies to run on a distressed bank.[49]

To evaluate this possibility, we classified companies in the top 1 percent of depositors at each bank as financial or nonfinancial companies and found that financial companies in the top 1 percent of depositors had

[48] All differences in run rates in the highlighted cells in Table 4 were statistically significant. Some run rates in cells that are not highlighted are also statistically significant, but the patterns were not consistent across banks.

[49] Carlson and Rose (2019) find that during the failure of Continental Illinois several types of financial intermediaries had higher run rates than other depositors with similar levels of uninsured deposits. Cipriani and La Spada (2024) find that financial firms were more sensitive to weak balance sheet fundamentals than general investors during the run on money market funds in 2020.

higher run rates than nonfinancial companies.[50] But both financial and nonfinancial companies that were top depositors generally had higher run rates than companies in the next lower percentile rank (Tables 5 and 6).[51]

TABLE 5
Unconditional Run Rates, Financial Companies in the Top 1 Percent of Depositors

	SVB			SBNY			FRB March		
RUN RATES OF DEPOSITORS THAT RAN BY MARCH 10, MARCH 13, MARCH 17, AND APRIL 28 (FRB)									
	10-Mar	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**
Percentile Rank									
<= 0.5 (Top Depositors)	41%	65%	82%	40%	70%	84%	33%	68%	84%
0.5 - 1.0	37%	51%	70%	24%	54%	64%	31%	63%	85%

Note: Depositors were ranked by their March 6, 2023, balance. A depositor could only run once, so depositors that ran by March 10 are included in the share of depositors that ran by March 13 and the share of depositors that ran by March 17.

TABLE 6
Unconditional Run Rates, Nonfinancial Companies in the Top 1 Percent of Depositors

	SVB			SBNY			FRB March		
RUN RATES OF DEPOSITORS THAT RAN BY MARCH 10, MARCH 13, MARCH 17, AND APRIL 28 (FRB)									
	10-Mar	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**	**10-Mar**	**13-Mar**	**17-Mar**
Percentile Rank									
<= 0.5 (Top Depositors)	25%	47%	73%	19%	38%	57%	20%	50%	72%
0.5 - 1.0	20%	42%	64%	11%	28%	49%	16%	46%	69%

Note: Depositors were ranked by their March 6, 2023, balance. A depositor could only run once, so depositors that ran by March 10 are included in the share of depositors that ran by March 13 and the share of depositors that ran by March 17.

OUTFLOW RATES OF THE LARGEST DEPOSIT TYPES

In this section, we examine outflow rates of the primary deposit types at each bank. Consistent with our previous analysis of net deposit outflows, we use deposit balances on March 6 as our starting point and study the behavior of the largest deposit types at each bank during the next nine business days, through March 17, the period with the heaviest deposit outflows. We continue our analysis with the week of March 20 for SVB and FRB.

Charts 7 through 10 show how deposit balances changed for the largest deposit types at SVB and FRB between March 6 and March 24, and at SBNY between March 6 and March 17. As discussed earlier, business deposits were the largest deposit type at all three banks. Active escrow deposits, consumer deposits, and brokered CDs were a large share of deposits at both SBNY and FRB. Other large deposit types were passive escrow deposits and government deposits at SBNY and trust deposits at FRB.

[50] We classified the following types of companies as financial companies: banks and other insured depositories, any subsidiaries or affiliates of banks, investment advisors and broker/dealers registered with the Securities and Exchange Commission, hedge funds, private equity funds, and insurance companies.

[51] At SBNY, the differences in run rates of financial company top depositors and depositors in the next lower percentile rank were statistically significant for all three dates. At SVB, the differences were statistically significant for March 13. At SBNY and FRB, the differences in run rates of nonfinancial company top depositors and depositors in the next lower percentile rank were statistically significant for all three dates. At SVB, the differences were statistically significant for March 10 and March 17.

CHART 7

Silicon Valley Bank - Changes in Deposit Balance of the Largest Deposit Types

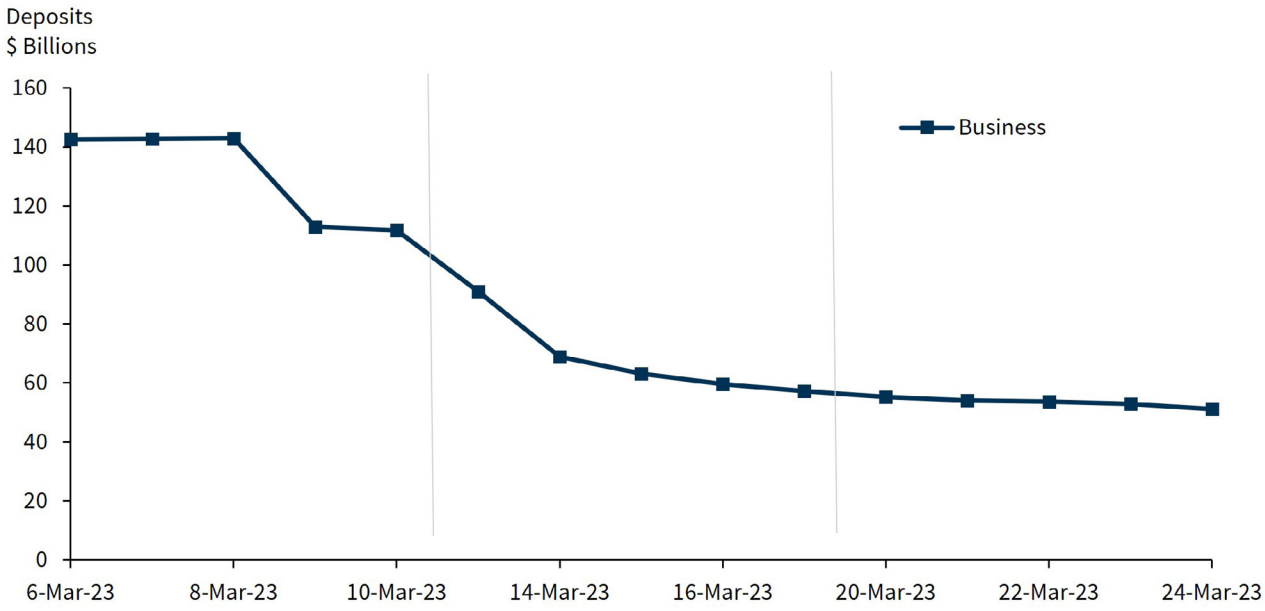
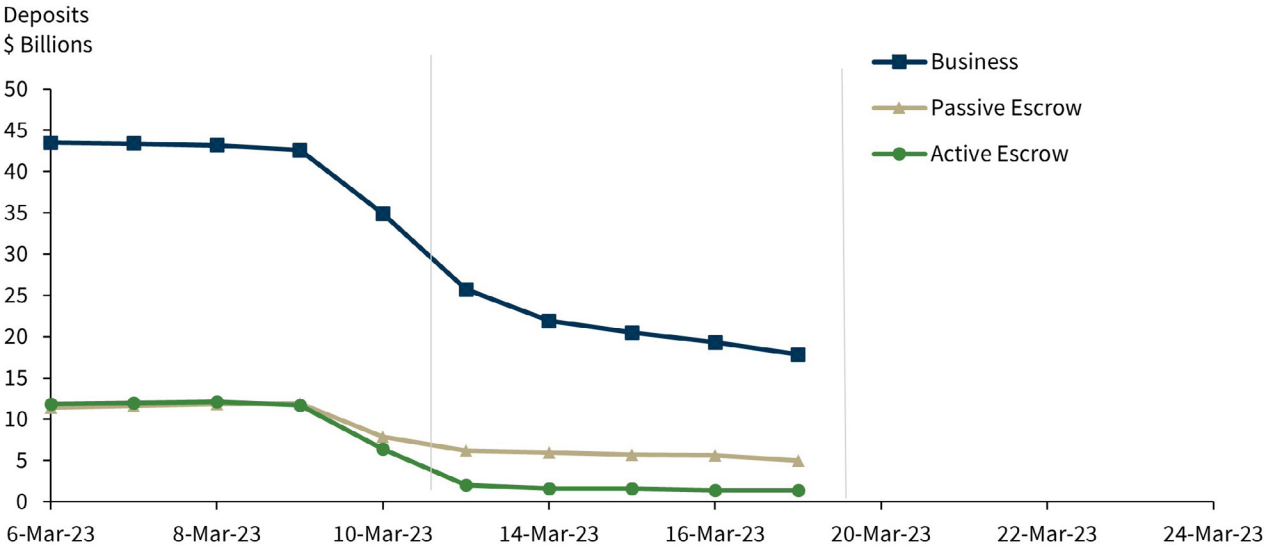


CHART 8

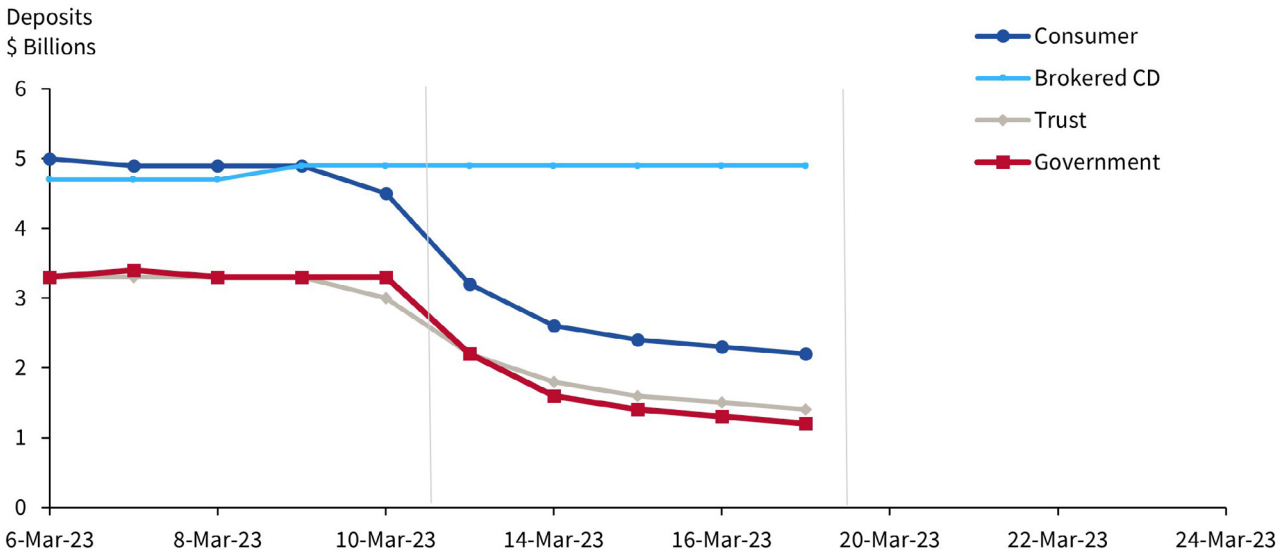
Signature Bank - Changes in Deposit Balance of the Largest Deposit Types



Note: This chart shows only half of the largest deposit types at Signature Bank. The other largest deposit types were Consumer, Brokered CD, Trust, and Government. On Monday, March 20, Flagstar Bank acquired substantially all the deposits of Signature Bridge Bank.

CHART 9

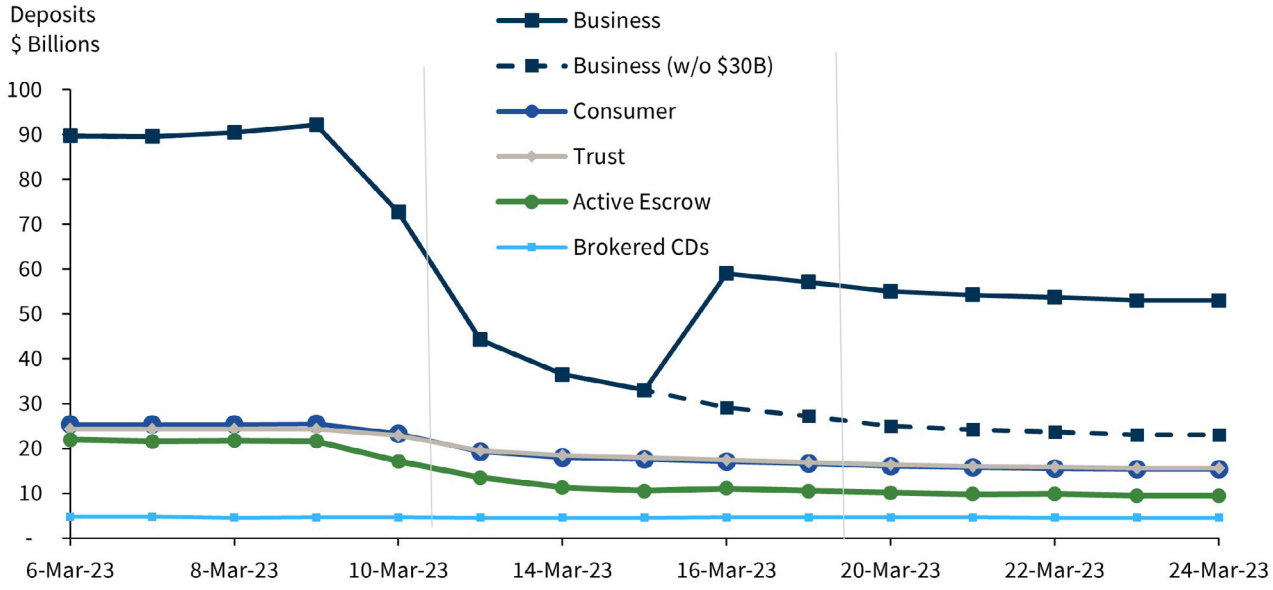
Signature Bank - Changes in Deposit Balance of the Largest Deposit Types



Note: This chart shows only half of the largest deposit types at Signature Bank. The other largest deposit types were Business, Passive Escrow, and Active Escrow. On Monday, March 20, Flagstar Bank acquired substantially all the deposits of Signature Bridge Bank.

CHART 10

First Republic Bank - Changes in Deposit Balance of the Largest Deposit Types



Note: Business (w/o $30B) shows business deposits excluding the $30 billion deposit from the consortium of 11 large banks.

At all three banks, business deposits fell rapidly and steeply. In three business days, March 9 through March 14, SVB lost 52 percent of its business deposits.[52] The run started on March 10 at SBNY and FRB. In three business days, 49 percent of SBNY's business deposits and 60 percent of FRB's business deposits had left.

Between March 7 and March 17, SBNY lost 59 percent of its business deposits, while SVB lost 60 percent and FRB lost 36 percent. If the $30 billion consortium deposit was excluded, FRB lost 70 percent of its business deposits in this period. During the week of March 20, business deposits fell an additional 4 percentage points at SVB and an additional 5 percentage points at FRB.

Passive escrow deposits at SBNY fell almost as steeply as business deposits. Between March 7 and March 17, more than half (57 percent) of these deposits left. Most of the decline in these deposits (48 percent) occurred in just two business days.

Active escrow deposits fell by the largest percentage among the primary deposit types at SBNY. In two business days, March 10 through March 13, these deposits fell 83 percent. And by March 17, these deposits fell 88 percent from their March 6 balance. At FRB, active escrow deposits also fell steeply but less than at SBNY. In three business days, March 10 through March 14, these deposits fell 35 percent. And by March 17, these deposits at FRB fell 52 percent from their March 6 balance.

Almost two-thirds (65 percent) of government deposits left SBNY between March 7 and March 17.

Consumer deposits are generally considered stable deposits, especially when they are fully insured.[53] Yet more than half (55 percent) of consumer deposits left SBNY and about one-third (34 percent) left FRB between March 7 and March 17. These deposits fell an additional 6 percentage points at FRB by the week ending March 24.

Deposits in brokered CDs at SBNY increased slightly on March 9 and then remained unchanged between March 9 and March 17. At FRB they fell 3 percent between March 7 and March 17 and remained essentially unchanged in the week of May 20.[54]

OUTFLOWS OF DEPOSITS IN BUSINESS OPERATIONS ACCOUNTS

We expect business depositors and depositors with passive escrow deposits generally choose to hold deposits at the bank in part to support business operations such as receiving and making payments. We hereafter refer to these accounts held by these depositors as business operations accounts. Deposits in business operations accounts, which are key to facilitating a business's financial transactions, would generally be expected to be a stable source of deposits. For example, these accounts may have automated debits and credits that could require time to redirect, particularly if the account is large and has many daily transactions.

As discussed in the previous section, business deposits at all three banks declined rapidly and steeply, falling by 36 to 60 percent between March 7 and March 17. Similarly, passive escrow deposits at SBNY fell 57 percent in the same period. These aggregate statistics, however, cannot distinguish between many partial withdrawals or a smaller number of complete withdrawals.

[52] The period from March 9 to March 14 includes three business days because SVB was closed early in the day on March 10.

[53] Iyer and Puri (2012) find retail depositors had lower outflow rates during periods of stress. Cipriani, Eisenbach, and Kovner (2024) find almost no evidence of a meaningful run in retail deposits across banks with significant outflows in early 2023.

[54] The outflows of brokered CDs were due to brokered CDs that had matured.

In this section, we take a closer look at the outflows of deposits from these two types of business operations accounts at the three banks. We focus on accounts owned by depositors that ran to see if these depositors left residual deposits in their business operations accounts to meet in-process, anticipated, or scheduled transactions. We examine the outflows of deposits in business accounts first, then look at the outflows of deposits in passive escrow accounts. To ensure that these accounts are business operations accounts, we exclude CDs from the analysis. We also restrict our analysis to accounts owned by business depositors that were not small businesses.[55]

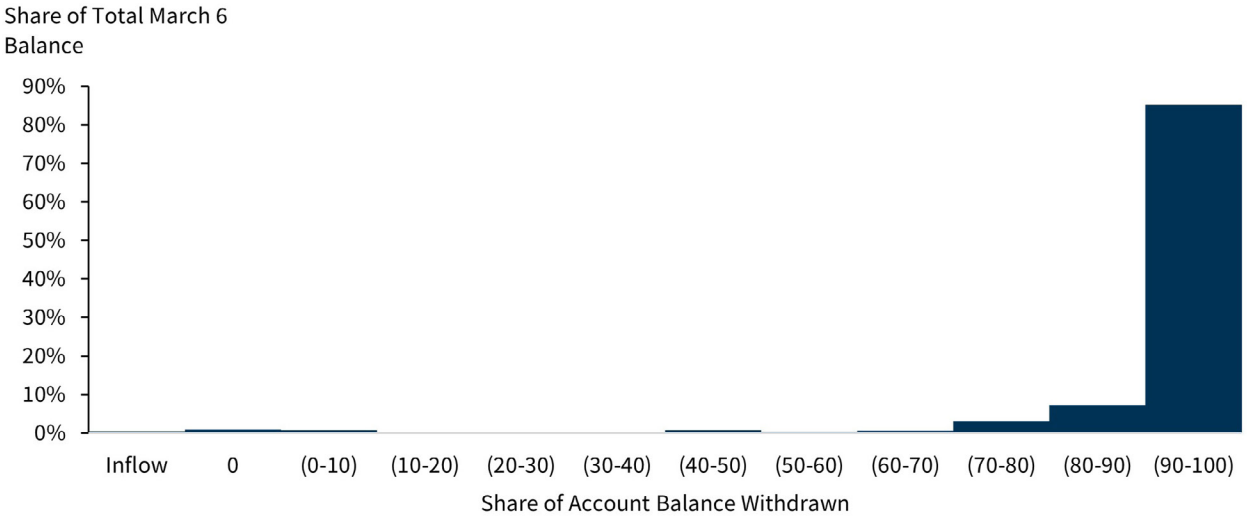
At all three banks, depositors that ran mostly withdrew all or almost all of their balances from their business operations accounts that held business deposits. Collectively, the data did not suggest that running depositors kept residual balances at the bank for payment purposes.

Charts 11, 12, and 13 show the share of balances withdrawn from business accounts owned by depositors that had run on each bank by March 17. The horizontal axis indicates the share of an account's March 6 balance that was withdrawn by these depositors. The vertical axis indicates how much of the total March 6 deposits owned by these depositors were in accounts that had been drawn down by a specific percentage.

Chart 11 shows that SVB depositors that ran by March 17 generally withdrew more than 70 percent of the balances in their business accounts. The accounts from which these depositors withdrew more than 90 percent of the balance collectively held 85 percent of the total business deposits of these depositors.

CHART 11

Silicon Valley Bank - Share of Balances Withdrawn from Business Accounts Owned by Depositors That Had Run



Note: The horizontal axis indicates the share of an account's March 6 balance that was withdrawn by depositors that ran by March 17. The vertical axis indicates how much of the total March 6 deposits owned by these depositors were in accounts that had been drawn down by a specific percentage.

[55] Depositors at each bank included in this analysis held more than $1.5 million in business-related deposit accounts at that bank.

Chart 12 shows that SBNY depositors that ran by March 17 generally withdrew more than 70 percent of the balances in their business accounts. The accounts from which these depositors withdrew more than 90 percent of the balance collectively held 88 percent of the business deposits of these depositors.

Chart 13 shows that FRB depositors that ran by March 17 generally withdrew more than 80 percent of the balances in their business accounts. The accounts from which these depositors withdrew more than 90 percent of the balance collectively held 81 percent of the business deposits of these depositors.

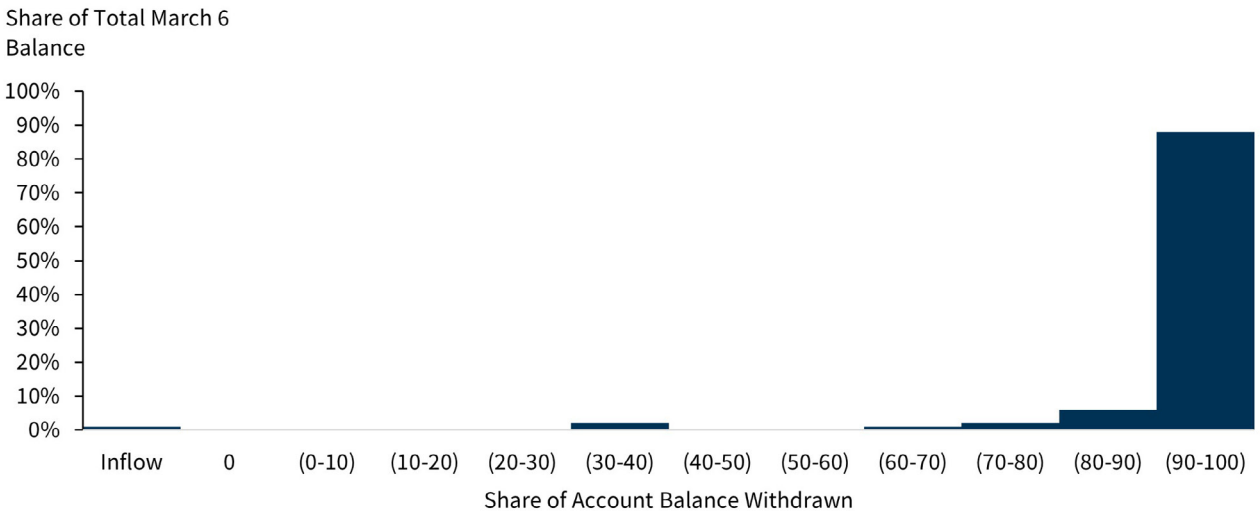
To determine if the results were driven by the behavior of financial companies, we conducted the same analysis for nonfinancial companies, in the top percentile of depositors at each bank, that ran. The results were remarkably similar to the results for all depositors that ran at each bank. Conditional on running, most nonfinancial companies withdrew at least 90 percent of their deposits in business operations accounts.

We observed similar withdrawal patterns for business operations accounts that held passive escrow deposits. Only SBNY had significant shares of passive escrow deposits. At SBNY, depositors that ran mostly withdrew all or almost all of their balances from their business operations accounts that held passive escrow deposits, leaving very little or nothing behind.

Chart 14 shows that SBNY depositors that ran by March 17 generally withdrew more than 90 percent of the balances in their passive escrow accounts. The accounts from which these depositors withdrew more than 90 percent of the balance collectively held 98 percent of the passive escrow deposits of these depositors.

CHART 12

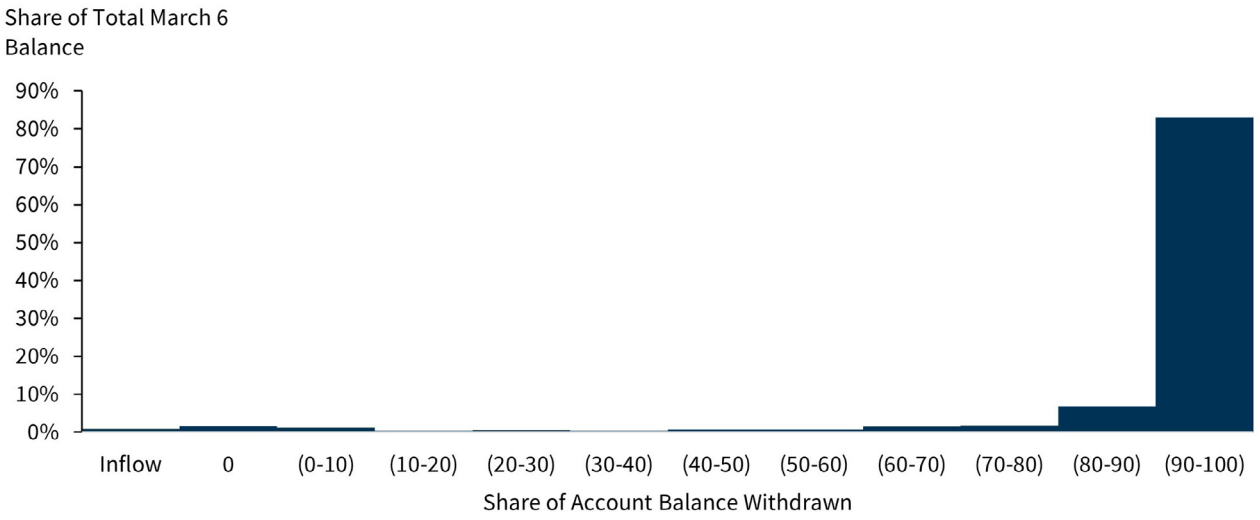
Signature Bank - Share of Balances Withdrawn from Business Accounts Owned by Depositors That Had Run



Note: The horizontal axis indicates the share of an account's March 6 balance that was withdrawn by depositors that ran by March 17. The vertical axis indicates how much of the total March 6 deposits owned by these depositors were in accounts that had been drawn down by a specific percentage.

CHART 13

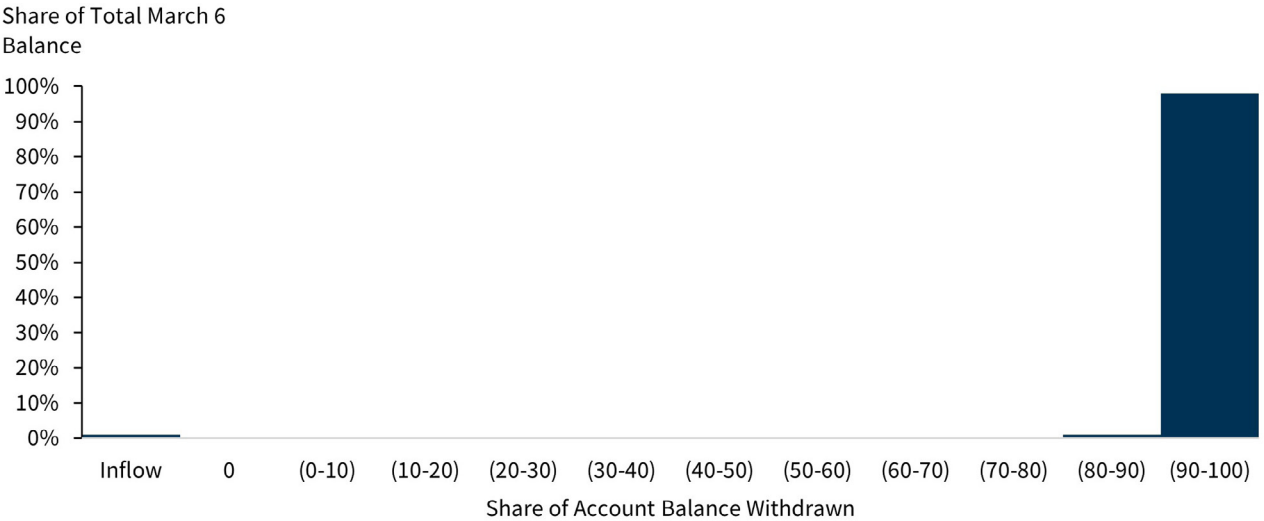
First Republic Bank - Share of Balances Withdrawn from Business Accounts Owned by Depositors That Had Run



Note: The horizontal axis indicates the share of an account's March 6 balance that was withdrawn by depositors that ran by March 17. The vertical axis indicates how much of the total March 6 deposits owned by these depositors were in accounts that had been drawn down by a specific percentage.

CHART 14

Signature Bank - Share of Balances Withdrawn from Passive Escrow Accounts Owned by Depositors That Had Run



Note: The horizontal axis indicates the share of an account's March 6 balance withdrawn by depositors that ran by March 17. The vertical axis indicates how much of the total March 6 deposits owned by these depositors were in accounts that had been drawn down by a specific percentage.

To explore the possibility that our results reflect natural variation in balances rather than run behavior, we also looked at deposits held by depositors that ran by March 17 in both types of business operations accounts in the two weeks before the stress period, from February 21 to March 3. For business accounts at all three banks and for passive escrow accounts at SBNY, deposit balances at the end of the two weeks generally increased or stayed the same as balances at the beginning for accounts that held the majority of these deposits (see Appendix D).

In summary, we find that at all three banks, depositors that ran mostly withdrew nearly all their balances in business operations accounts, leaving very little to no residual balances for business transactions purposes. We observed this for both financial and nonfinancial firms. Our analysis focused on depositors that ran by March 17, which was a span of six business days from the first day of the run at each bank.

OUTFLOW RATES OF INSURED AND UNINSURED DEPOSITS

In this section, we examine the outflow rates of the estimated uninsured and insured deposits at each of the three banks. Consistent with our analyses in earlier sections, we use deposit balances on March 6 as our starting point and study the behavior of insured and uninsured deposits at each bank between March 7 and March 17, the period with the heaviest deposit outflows. We also explore outflows of insured and uninsured deposits at SVB and FRB the week of March 20.

On Sunday, March 12, the systemic risk exception was invoked which, among other things, extended full deposit insurance coverage to all deposits at SVB and SBNY. We analyzed deposits that would have been uninsured in the absence of the systemic risk exception (hereafter uninsured deposits) separately from deposits insured even without the systemic risk exception (hereafter insured deposits) to show differences in their outflows.

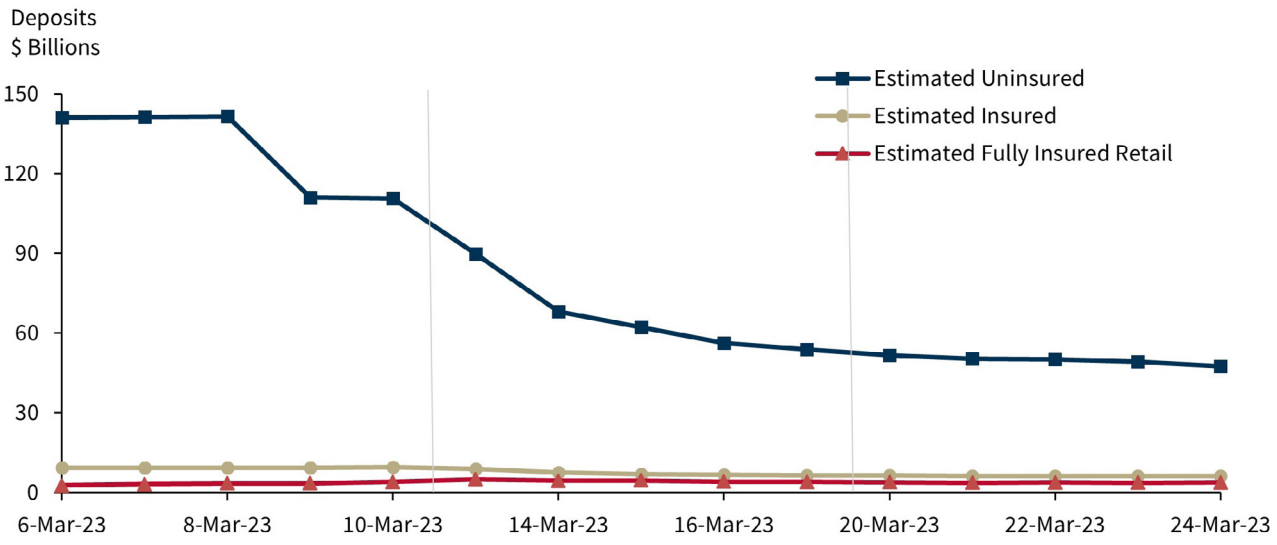
In addition, we examined the behavior of deposits held by retail depositors that were fully insured on March 6 separately from total insured deposits, which included deposits held by third parties and insured portions of balances that contained uninsured funds. Deposits of retail depositors used in this analysis were consumer deposits, consumer retirement deposits, business deposits of small businesses, deposits of estates, and trust deposits that were fully insured on March 6, 2023.[56]

Charts 15, 16, and 17 show how uninsured and insured deposit balances changed at each bank between March 6 and March 17, and at SVB and FRB the week of March 20.

[56] In this analysis, we included only deposits for which the retail depositor was also the beneficial owner. For example, we excluded escrow or custodial deposits held by a small business depositor even if the escrow or custodial deposit was fully insured on March 6.

CHART 15

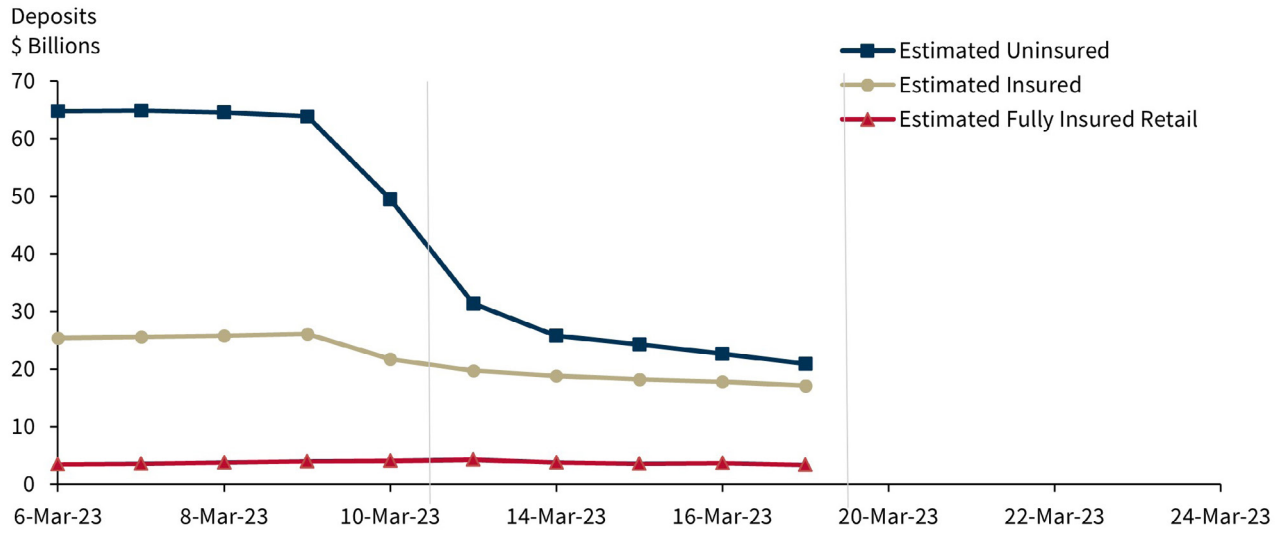
Silicon Valley Bank - Changes in Estimated Insured and Uninsured Deposits



Note: Fully insured retail deposits were consumer deposits, consumer retirement deposits, business deposits of small businesses, deposits of estates, and trust deposits that were fully insured on March 6, 2023, and for which the depositor was the beneficial owner.

CHART 16

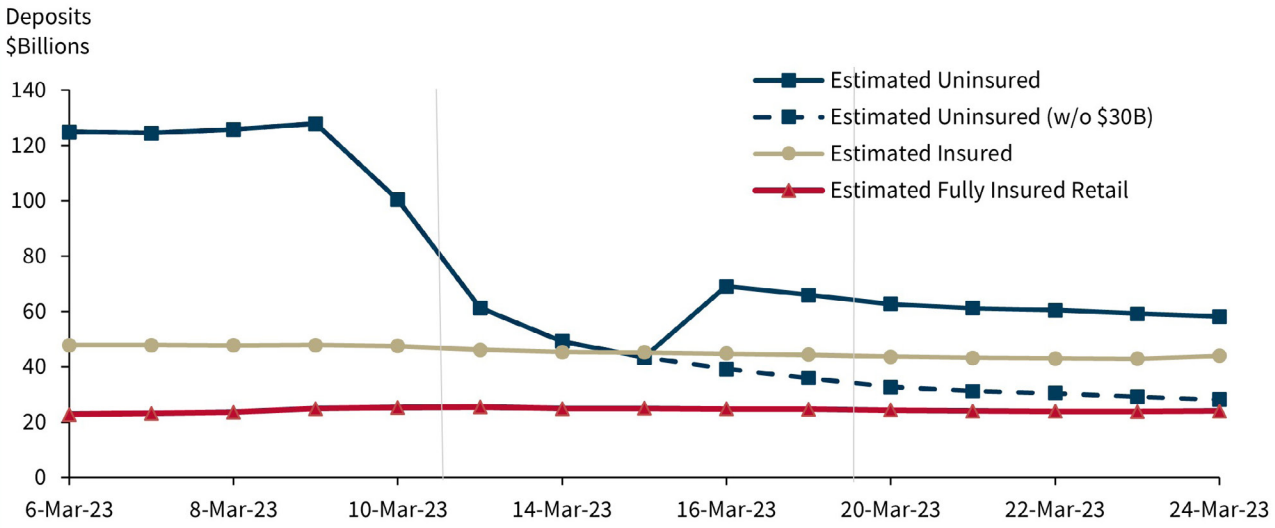
Signature Bank - Changes in Estimated Insured and Uninsured Deposits



Note: Fully insured retail deposits were consumer deposits, consumer retirement deposits, business deposits of small businesses, deposits of estates, and trust deposits that were fully insured on March 6, 2023, and for which the depositor was the beneficial owner. On Monday, March 20, Flagstar Bank acquired substantially all the deposits of Signature Bridge Bank.

CHART 17

First Republic Bank - Changes in Estimated Insured and Uninsured Deposits



Note: Fully insured retail deposits were consumer deposits, consumer retirement deposits, business deposits of small businesses, deposits of estates, and trust deposits that were fully insured on March 6, 2023, and for which the depositor was the beneficial owner. Uninsured (w/o $30B) shows uninsured deposits excluding the $30 billion deposit from the consortium of 11 large banks.

At all three banks, uninsured deposits left at very high rates between March 7 and March 17, with a smaller amount of additional outflows from SVB and FRB the week of March 20.

SVB and SBNY had similar levels of uninsured deposit outflows. Between March 7 and March 17, SVB's uninsured deposits fell 62 percent relative to its March 6 balance and fell an additional 5 percentage points the week of March 20. Between March 7 and March 17, SBNY had outflows of 68 percent of its March 6 level of uninsured deposits.

The sharpest declines in uninsured deposits at SVB were on March 9, March 13, and March 14.[57] At SBNY, the sharpest declines were on March 10, March 13, and March 14. March 13 and 14 were during the first two days of Silicon Valley Bridge Bank and Signature Bridge Bank and when the systemic risk exception was in place.

FRB, which did not fail during this period, had lower outflows of uninsured deposits than SVB and SBNY due to inflows from the $30 billion consortium deposit on March 16, which was uninsured. FRB's uninsured deposits fell 47 percent between March 7 and March 17 and fell an additional 6 percentage points the following week, ending 53 percent lower than on March 6. However, if the $30 billion consortium deposit was excluded, FRB lost 71 percent of its March 6 uninsured deposits between March 7 and March 17, higher than both SVB and SBNY, with an additional 7 percentage point decline the following week.

Large shares of insured deposits also flowed out of SVB and SBNY, though at slower rates than uninsured deposits. Passive escrow deposits, which we assumed to be fully insured from pass-through insurance coverage, made up a significant share of SBNY's total estimated insured deposits, and, as we reported in

[57] SVB was closed early in the day on March 10, which likely prevented significant deposit outflows that day.

earlier sections, these deposits declined steeply.[58] In addition, at all three banks, large amounts of insured deposits were held by depositors that also had uninsured balances. As uninsured depositors ran, they generally withdrew their insured balances as well.

These facts motivated our separate study of the behavior of deposits held by retail depositors that were fully insured on March 6 (hereafter fully insured retail deposits). On March 6, about 2 percent of total deposits at SVB were fully insured retail deposits, but these deposits were held by 66 percent of SVB depositors. Similarly, at SBNY, about 4 percent of total deposits were fully insured retail deposits on March 6, but these deposits were held by 83 percent of SBNY depositors. Fully insured retail deposits accounted for a much higher share of total deposits at FRB compared with the other two banks. Thirteen percent of FRB's total deposits on March 6 were fully insured retail deposits, and these deposits were held by 96 percent of FRB depositors.

Between March 7 and March 17, total insured deposits at SVB fell 30 percentage points, while fully insured retail deposits increased substantially (by 46 percentage points). In the same period, total insured deposits at SBNY fell 33 percentage points, while fully insured retail deposits increased between March 7 and March 13 and then returned to roughly the March 6 balance by March 17. At FRB, total insured deposits fell 7 percentage points between March 7 and March 17, while retail fully insured deposits increased 8 percentage points.

WIRE TRANSFER REQUESTS AND COMPLETIONS

Data on wire transfers to and from the three banks show that nearly all funds withdrawn during the period March 7 through March 17 left by wire transfer. At SVB, 87 percent of the $89.9 billion of net deposit loss during this period was transferred by wire. At SBNY, 83 percent of the $52.1 billion net deposit loss during this period left by wire transfer. At FRB, 65 percent of the $62.4 billion net deposit loss during this period was transferred by wire.[59]

Large volumes of wire transfers continued into the week of March 13, after the failures of SVB and SBNY, the establishment of bridge banks for both banks, and the invocation of the systemic risk exception. We distinguished between the request and the completion of a given wire transfer to isolate the timing of withdrawal decisions. If the observed declines in total deposit balances the week of March 13 were simply the result of the delayed processing of wire requests submitted the previous week, then perhaps the run effectively ended by or before March 12. On the other hand, if depositors initiated additional deposit withdrawals on March 13 or later, then the run continued after the establishment of the bridge banks and the invocation of the systemic risk exception. We found that some depositors continued running the week of March 13.

[58] Passive escrow deposits were very small shares of total deposits at SVB and FRB.

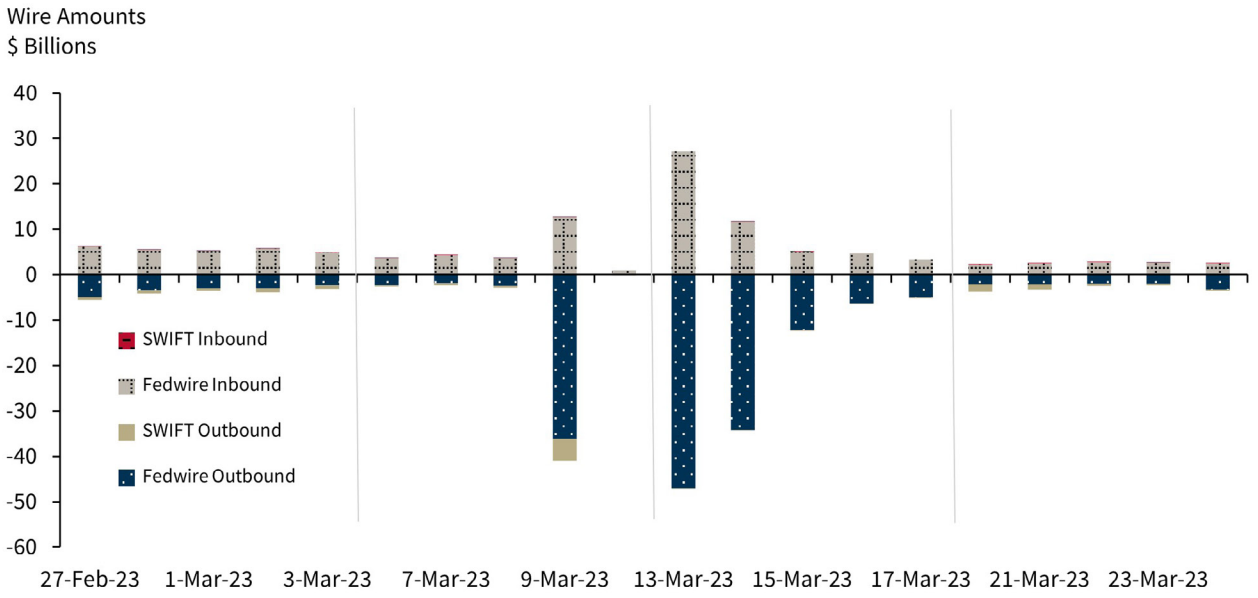
[59] Without the $30 billion deposit and associated wire transfers, 77 percent of the $92.4 billion net deposit loss during this period was transferred by wire.

WIRE TRANSFERS – SILICON VALLEY BANK

Chart 18 shows the total dollars inbound and outbound transferred, using Fedwire or SWIFT, to and from SVB between February 27 and March 24, 2023. We show transfers for the week of February 27 to allow comparison of wire transfer activity during a non-stress period. Compared with the week of February 27, which preceded the week in which the runs started, SVB had significantly higher volumes of outbound wire transfers during the four business days from March 9 to March 15, excluding March 10, the day that it failed.

CHART 18

Silicon Valley Bank - Completed Wire Transfers



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was Silicon Valley Bank.

On Thursday, March 9, there was roughly $28 billion in net outbound wires. Net deposit outflows on that day totaled $30.2 billion, so about 93 percent of the net deposit outflow left SVB via wire transfer.[60] The dollar amount of net outbound wires remained high on Monday, March 13, totaling about $20 billion, or 93 percent of the net deposit outflow of $21.5 billion on that day. Deposits continued to flow out of SVB through wire transfers in the first week of Silicon Valley Bridge Bank (March 13 to 17). Deposit and wire transfer outflows slowed by the end of that week.

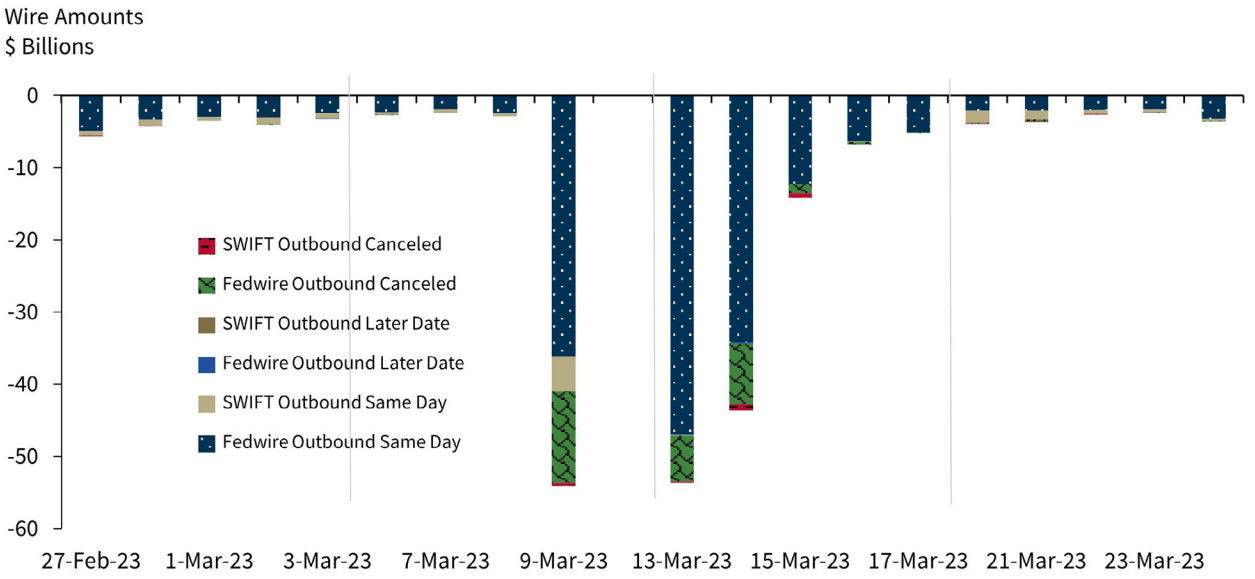
The operational data allowed us to distinguish if the wire transfers on Monday, March 13, were new requests submitted that day or were requests delayed in execution but made before invocation of the systemic risk exception and the establishment of Silicon Valley Bridge Bank. Chart 19 shows dollar volumes of requested wire transfers by whether the transfer was completed the same day as the request or a subsequent day, or whether it was eventually canceled. The dates in the chart are the request dates for the wires.

[60] There was also a marked increase in the volume of inbound wire transfers on Thursday, March 9; Monday, March 13; and Tuesday, March 14. A large share of the inbound wires on those three days were end-of-day sweeps from money market funds to depositor accounts.

Depositors at SVB submitted $54 billion in outbound wire transfer requests on Thursday, March 9, of which requests totaling $41 billion were completed that day and about $1 billion were canceled that day. The remaining $12.1 billion of wire transfer requests submitted on Thursday, March 9, were queued for execution the morning of Friday, March 10. These wire requests were subsequently canceled (as indicated by the "Fedwire Canceled" and "SWIFT Canceled" bars in Chart 19).[61]

CHART 19

Silicon Valley Bank - Requested Outbound Wire Transfers and Disposition



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was Silicon Valley Bank. SVB's wire data did not show any SWIFT wires that were outbound on a later date.

Many, but not all, depositors whose wire transfer requests were queued for execution on Friday that were subsequently canceled submitted new requests in the following days. Almost three quarters (73 percent) of depositors whose wire requests were canceled on Friday, March 10, successfully sent new wires on Monday, March 13, or Tuesday, March 14. Specifically, 55 percent sent new wires totaling $8.3 billion on Monday, March 13, and 36 percent sent new wires totaling $5.1 billion on Tuesday, March 14.[62] The new wire transfers by these depositors in those two days were, on average, larger than the wires they requested on Thursday, March 9, before SVB failed. The Thursday wire requests from these depositors totaled $10.6 billion, $2.8 billion less than they sent out on Monday and Tuesday of the following week.

Total outbound wire requests on Monday, March 13, were $54 billion, with $47 billion completed that day.[63] Outbound wire requests remained high on Tuesday, March 14, with almost $44 billion requested and $34 billion completed that day. A large majority (82 percent) of depositors that sent outbound wires on Monday

[61] Public reports indicated that SVB expected $100 billion of deposit outflows on Friday, March 10. See the Board of Governors of the Federal Reserve System, "Review of the Federal Reserve's Supervision and Regulation of Silicon Valley Bank," April 28, 2023. The wire system data that we analyzed showed a total of $12.1 billion of wires awaiting execution on the morning of Friday, March 10. SVB had many precursor systems through which wire requests were routed before execution, so additional wire requests may have been in the pipeline but not yet marked as ready for execution.

[62] Some of these depositors submitted wire requests on both Monday and Tuesday.

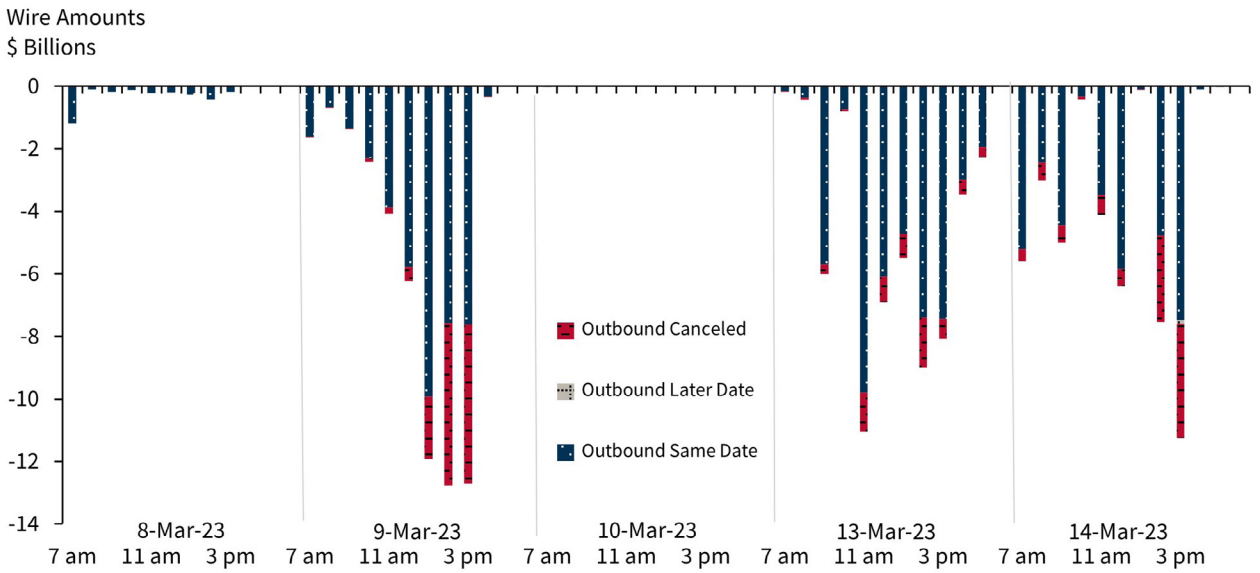
[63] The $47 billion of completed wires on Monday, March 13, included the $8.3 billion of new wires sent by depositors whose Thursday, March 9, wire transfer requests were canceled on Friday, March 10.

or Tuesday had also successfully transferred funds by wire on Thursday, March 9. Together, these findings suggest many depositors that withdrew funds using wires before the bank failed continued to do so after the systemic risk exception invocation and establishment of the bridge bank.

In Chart 20, we show the timing of wire transfer requests on the three days with the heaviest volume of outbound wire transfers: Thursday, March 9; Monday, March 13; and Tuesday, March 14. We also show hourly requests for Wednesday, March 8, for comparison. The chart shows the dollar volume of outbound wire transfers requested in each hour of the day on those four days. Due to the low volume of requests submitted before 7 a.m., we combined those requests with requests submitted between 7 a.m. and 8 a.m. Similarly, requests submitted after 6 p.m. were combined with requests submitted at 6 p.m.

CHART 20

Silicon Valley Bank - Hourly Requested Outbound Wire Transfers and Disposition



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was Silicon Valley Bank. The bar at 7 am includes all wire submissions before 8 am. The bar at 6 pm includes all wire submissions from 6 pm to midnight.

On Thursday, March 9, the dollar volume of wire transfer requests increased steadily between 9 a.m. and 1 p.m. There was a substantial increase at 1 p.m. that persisted until 4 p.m. About 69 percent of the total dollar volume of wire transfer requests submitted on Thursday, March 9, was submitted during this three-hour window, and 88 percent was submitted between 11 a.m. and 4 p.m. Notably, the share of requests that were canceled (as indicated by the "Outbound Canceled" bars in Chart 20) increased sharply between 1 p.m. and 4 p.m. as well. Almost all of the $1.1 billion of wire transfer requests that were queued for execution the morning of Friday, March 10, and subsequently canceled were submitted during this three-hour window. On Monday, March 13, on the first day of Silicon Valley Bridge Bank, high volumes of wire transfer requests were submitted over much of the day, tapering off at 4 p.m.

Given the speed of the run at SVB, depositors may have found it easier to transfer their deposits to other banks if they already had an established relationship with another bank. The collected data on wires contain an extensive history of transactions that allowed us to observe wire behavior of depositors well before the

March 2023 stress period. One limitation was that we could not reliably identify the owner of the destination account. But presumably most wires during the two weeks in March when SVB failed and during the operation of the bridge bank were to accounts owned by fleeing depositors. To examine the importance of existing bank relationships in run behavior, we examined whether depositors sent outbound wires between March 7 and March 17 to accounts where they had sent or received wires in the previous six months. If they had, the destination account predated the run. If they had not, the destination account could still have existed before the run but had not been a recent destination for wire transfers for or by that depositor.

Among depositors that sent outbound wire transfers between March 7 and March 17, about 1 in 5 depositors wired their deposits exclusively to destination accounts to or from which the depositor had wired money in the previous six months. Over half of depositors that sent outbound wire transfers during this period wired their deposits exclusively to destination accounts to or from which the depositor had not wired any money in the previous six months. The remaining depositors wired money to a mix of accounts with and without previous wire transfer activity.

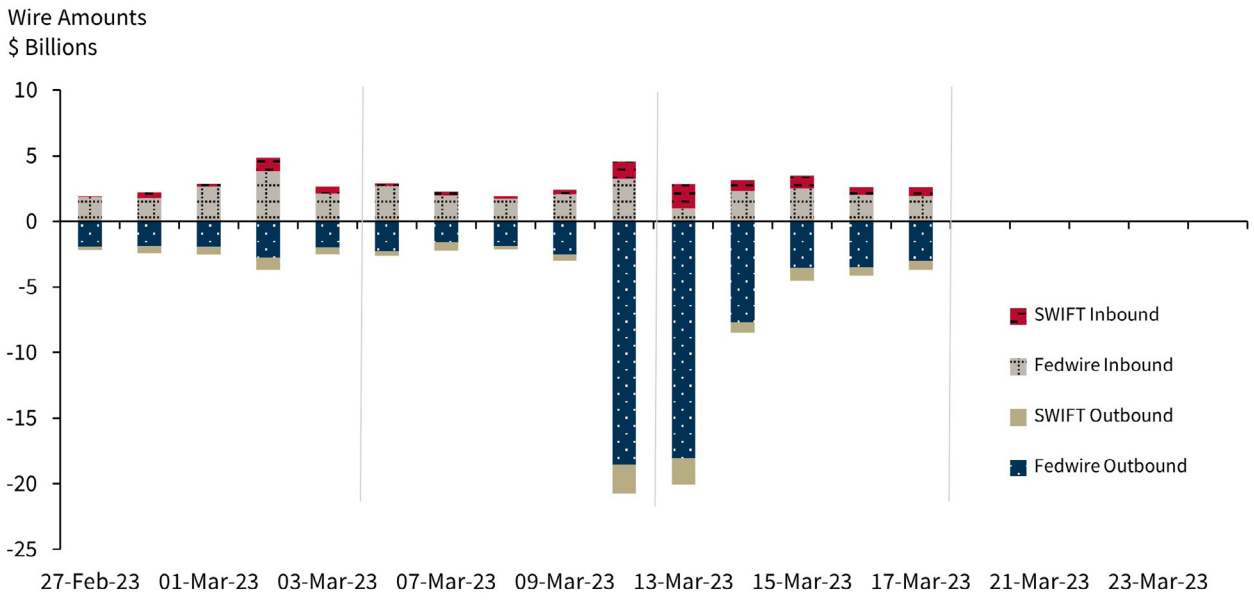
Of the roughly $150 billion that depositors wired out of SVB between March 7 and March 17, about 43 percent was wired to destination accounts to or from which the depositor had wired money in the previous six months.

WIRE TRANSFERS – SIGNATURE BANK

Chart 21 shows the total dollars inbound and outbound that were transferred, using Fedwire or SWIFT, to and from SBNY between February 27 and March 24, 2023. On Friday, March 10, there was roughly $16 billion net outbound on Fedwire and about $1 billion net outbound on SWIFT. Net deposit outflows on that day were about $18.7 billion, so about 86 percent of the net deposit outflow left the bank via wire transfer. Similar outflows occurred on Monday, March 13.

CHART 21

Signature Bank - Completed Wire Transfers



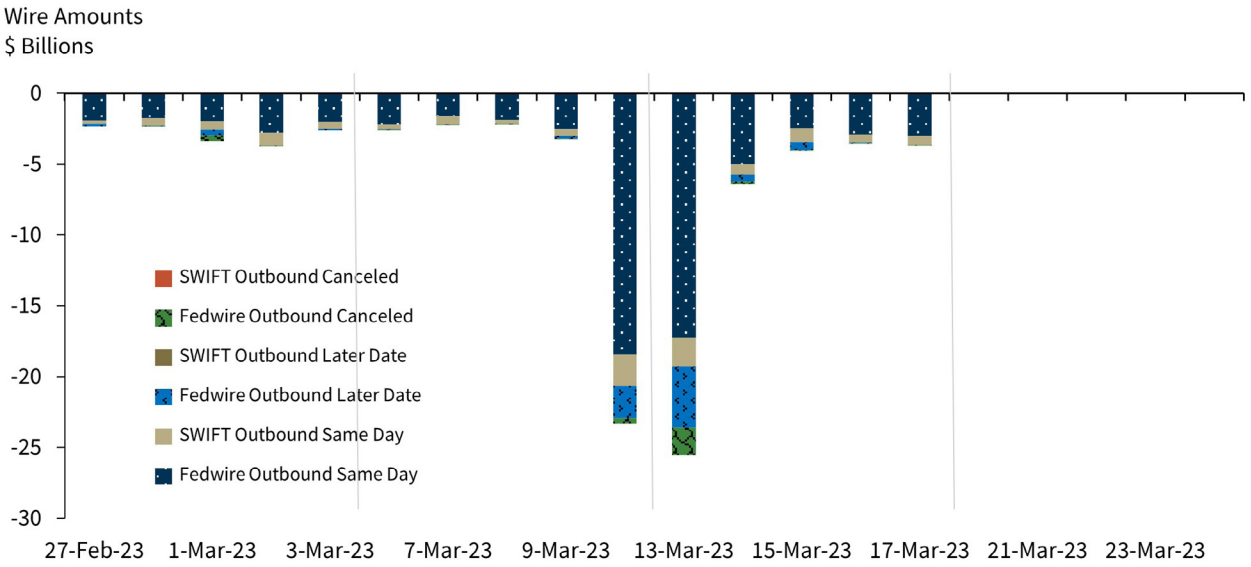
Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was Signature Bank.

We examined whether wire transfers completed on Monday, March 13, were new requests submitted that day or were requests delayed in execution but made before invocation of the systemic risk exception and establishment of Signature Bridge Bank. Chart 22 shows dollar volumes of requested wire transfers by whether the transfer was completed the same day as the request or a subsequent day, or whether it was eventually canceled. The dates in the chart are the request dates for the wires.

Of the $23.3 billion of outbound wire transfer requests submitted to the wire system on Friday, March 10, about $2.2 billion did not go out that day but was completed on a later date (as indicated by the "Fedwire Outbound Later Date" bar in Chart 22).

CHART 22

Signature Bank - Requested Outbound Wire Transfers and Disposition



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was Signature Bank. SBNY wire data did not show any SWIFT wires that were outbound on a later date or canceled.

Reports from the FDIC and New York State Department of Financial Services on the supervision of SBNY note that up to $7.4 billion was queued and expected to execute on Monday, including $2.2 billion that did not go out Friday and $5.2 billion of new wire requests submitted over the weekend.[64] The new wire requests do not appear in the wire system data. We believe SBNY had a precursor system where wire transfer requests were first screened for Bank Secrecy Act (BSA)/Anti-Money Laundering (AML)/Office of Foreign Assets (OFAC) concerns, after which the wire requests were sent to the wire system. Wires submitted over the weekend were likely pending in the BSA/AML/OFAC precursor system and most were canceled by the bridge bank before they hit the wire system. Depositors with canceled wire transfers had to submit new requests.

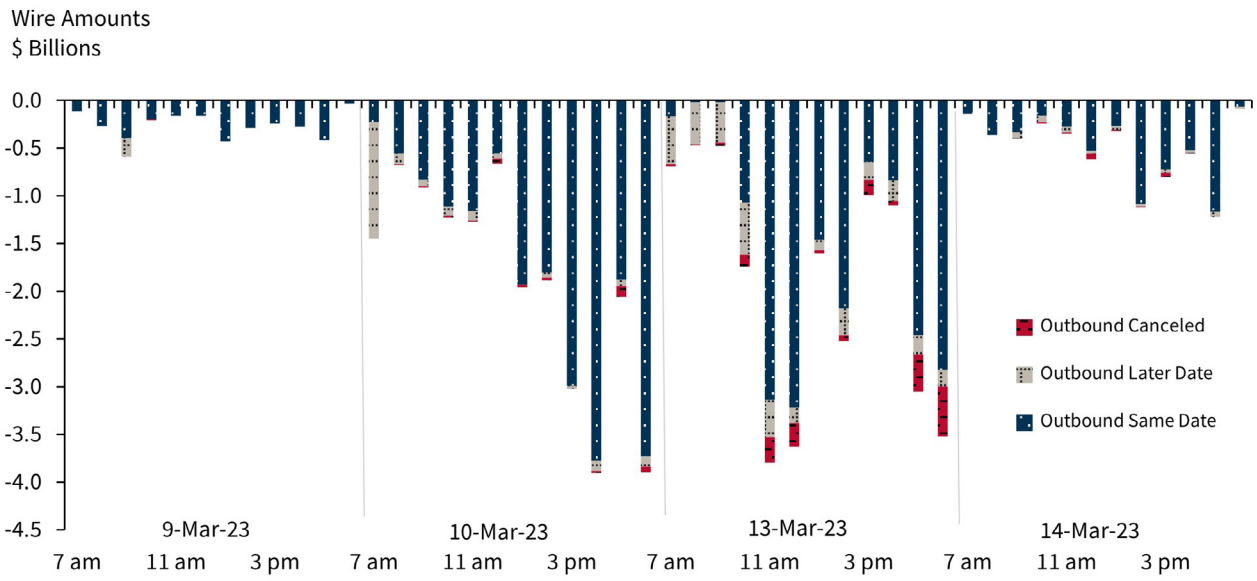
[64] See FDIC. "FDIC's Supervision of Signature Bank." April 2023, and New York State Department of Financial Services. "Internal Review of the Supervision and Closure of Signature Bank." April 2023.

While we did not observe the cancellation of the $5.2 billion in wire requests submitted over the weekend, we did find that $17 billion in outbound Fedwire requests and $2 billion in outbound SWIFT requests received by the wire system on Monday, March 13, were completed the same day. This $19 billion in outbound wire transfer requests received and completed by the wire system on Monday, March 13, was substantially higher than the $7.4 billion in pending wires submitted by Sunday evening.[65] This suggests that depositors submitted at least $11 billion of requests to wire funds out of SBNY on Monday, March 13, after the establishment of the bridge bank and invocation of the systemic risk exception.

In Chart 23, we show the timing of wire transfer requests on the three days with the heaviest volume of outbound wire transfers: Friday, March 10; Monday, March 13; and Tuesday, March 14. We also show hourly requests for Thursday, March 9, for comparison.

CHART 23

Signature Bank - Hourly Requested Outbound Wire Transfers and Disposition



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was Signature Bank. The bar at 7 am includes all wire submissions before 8 am. The bar at 6 pm includes all wire submissions from 6 pm to midnight.

On Friday, March 10, the dollar volume of wire transfer requests increased as the day progressed. There was a large increase at 1 p.m., a sharper increase at 3 p.m., and another increase at 4 p.m. About 56 percent of the total dollar volume of wire transfer requests submitted on Friday, March 10, was submitted from 3 p.m. onward. On Monday, March 13, the first day of Signature Bridge Bank's operations, roughly 15 percent of the dollar volume of outbound wire transfer requests submitted that day was submitted before 11 a.m.; wire transfer requests for an additional 32 percent of the total dollar volume were submitted between 11 a.m. and 1 p.m.

Among depositors that sent outbound wire transfers between March 7 and March 17, about a third wired their deposits exclusively to destination accounts to or from which the depositor had wired money in the previous six months. About half of the depositors that sent outbound wire transfers during this period wired their

[65] The $7.4 billion of pending wires includes the $2.2 billion that was submitted on Friday, March 10, and was queued in the wire system, and an additional $5.2 billion submitted over the weekend, most of which was canceled but could have been resubmitted by depositors on Monday.

deposits exclusively to destination accounts to or from which the depositor had not wired any money in the previous six months. The remaining depositors wired money to a mix of accounts with and without previous wire transfer activity.

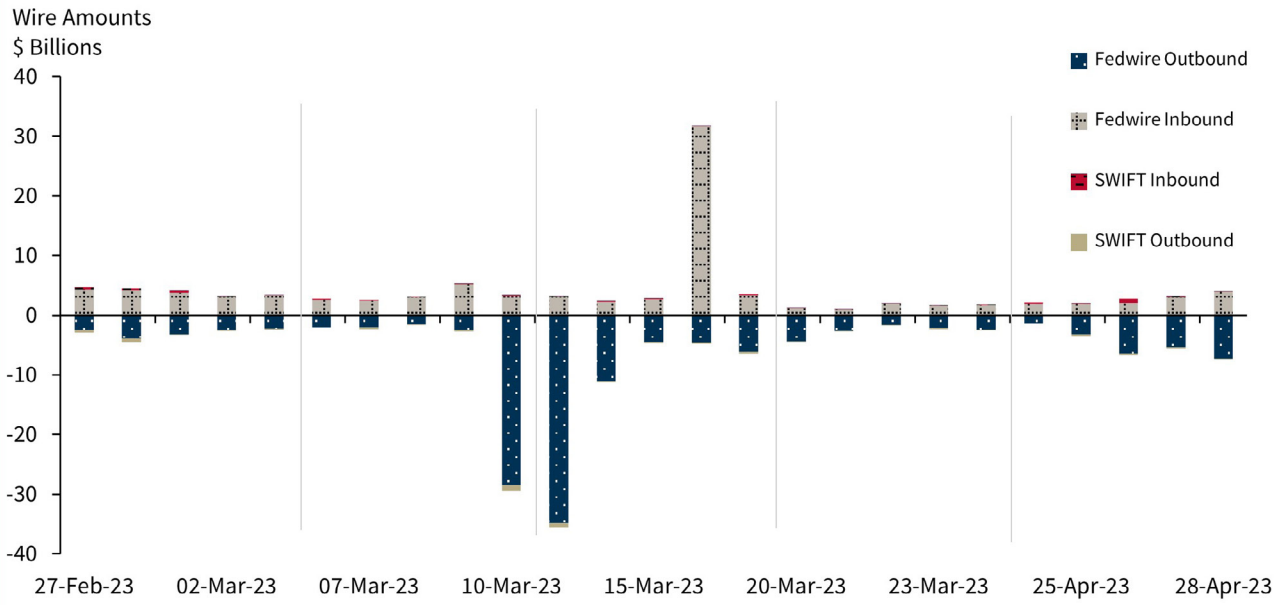
Of the roughly $80 billion that depositors wired from SBNY between March 7 and March 17, about 49 percent was wired to destination accounts to or from which the depositor had wired money in the previous six months.

WIRE TRANSFERS – FIRST REPUBLIC BANK

Chart 24 shows the total dollars inbound and outbound transferred, using Fedwire or SWIFT, to and from FRB between February 27 and March 24, 2023. Compared with the week of February 27, which preceded the weeks when depositors ran, FRB saw significantly higher volumes of outbound wire transfers during the three business days from March 9 to March 14. In addition, FRB saw increased outbound wire transfer volume the last three days of the week of April 24, just before it failed.

CHART 24

First Republic Bank - Completed Wire Transfers



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was First Republic Bank.

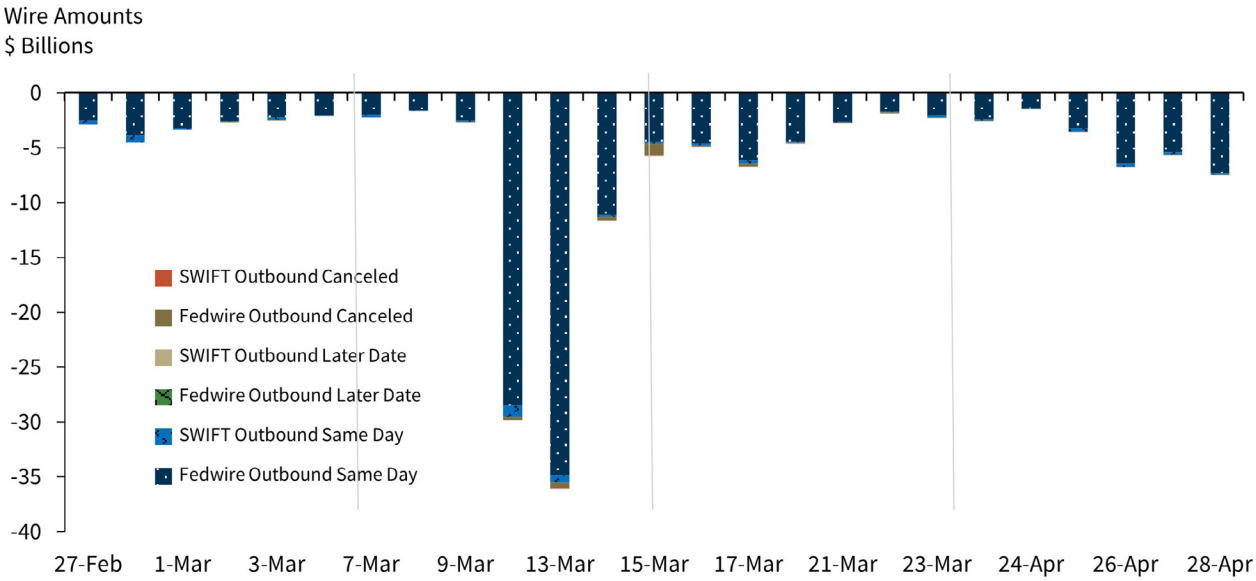
On Friday, March 10, there were roughly $25 billion net outbound on Fedwire and about $1 billion net outbound on SWIFT. Net deposit outflows on that day were about $27 billion, indicating that the vast majority of the net deposit outflow left the bank via wire transfer.

FRB received a $30 billion deposit from a consortium of 11 banks on March 16, the only day with a substantial inflow of deposits during our analysis period. Net outbound wire transfers continued at a more moderate pace from March 15 until failure, matching the declines in total deposits over the same period.

Chart 25 shows dollar volumes of requested wire transfers by whether the transfer was completed the same day as the request or on a subsequent day, or whether it was eventually canceled. The dates in the chart are the request dates for the wires.

CHART 25

First Republic Bank - Requested Outbound Wire Transfers and Disposition



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was First Republic Bank. FRB's wire data did not show any wires that were outbound on a later date.

In Chart 26, we show the timing of wire transfer requests on the three days with the heaviest volume of outbound wire transfers: Friday, March 10; Monday, March 13; and Tuesday, March 14. We also show hourly requests for Thursday, March 9, for comparison.

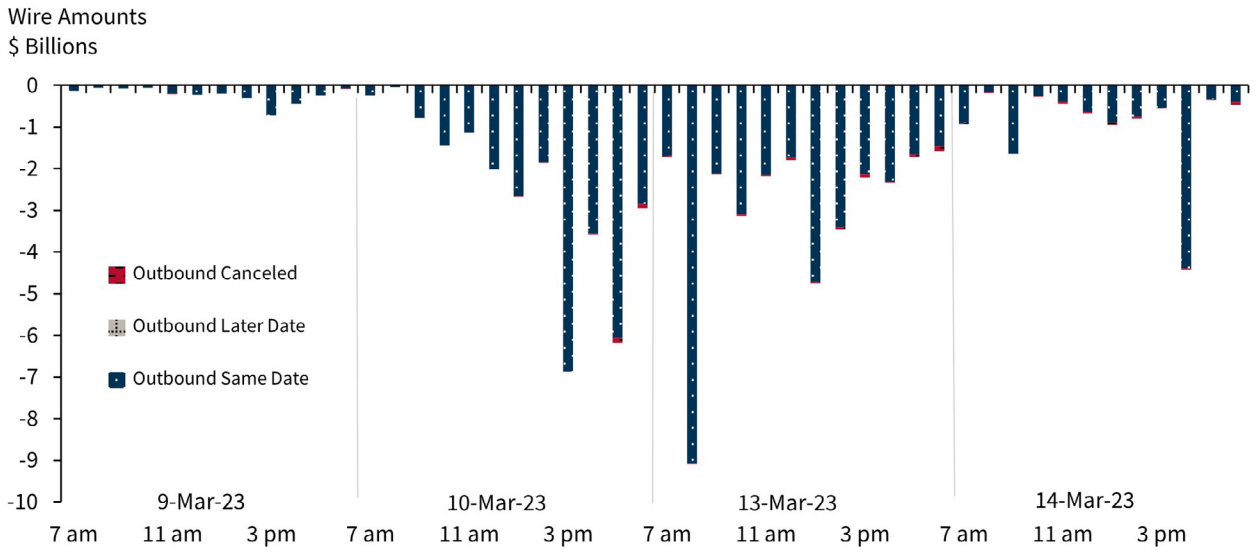
On Friday, March 10, the dollar volume of wire transfer requests increased as the day progressed, with a sharp increase at 3 p.m. Two thirds of the dollar volume of wire transfer requests submitted on Friday, March 10, was submitted from 3 p.m. onwards. On Monday, March 13, almost $11 billion of wire transfer requests (about 30 percent of the day's total) were submitted before 9 a.m.

Among depositors that sent outbound wire transfers between March 7 and March 17, almost one in three wired their deposits exclusively to destination accounts to or from which the depositor had wired money in the previous six months. Over half of depositors that sent outbound wire transfers during this period wired their deposits exclusively to destination accounts to or from which the depositor had not wired any money in the previous six months. The remaining depositors wired money to a mix of accounts with and without previous wire transfer activity.

Of the roughly $99 billion that depositors wired out of FRB between March 7 and March 17, about 42 percent was wired to destination accounts to or from which the depositor had wired money in the previous six months.

CHART 26

First Republic Bank - Hourly Requested Outbound Wire Transfers and Disposition



Note: Excludes wire transfers into and out of accounts containing funds for which the beneficial owner was First Republic Bank. The bar at 7 am includes all wire submissions before 8 am. The bar at 6 pm includes all wire transmissions from 6 pm to midnight. FRB's wire data did not show any wires that were outbound on a later date.

In summary, at all three banks, roughly 80 percent or more of net deposit outflows left by wire transfer. At SVB, most, but not all, depositors with wire transfer requests that were submitted before the bank's failure but then canceled submitted new wires in the subsequent two days when Silicon Valley Bridge Bank was operational and the systemic risk exception was in place. At SBNY, the operational data did not show pending wires canceled by the bridge bank; however, the data did show wire transfer requests submitted on Monday, March 13, the first day of Signature Bridge Bank's operations; those requests totaled more than twice the dollar amount of the canceled pending wires. These findings suggest that many depositors at SVB and SBNY submitted new wires after the bridge banks began operating and after the systemic risk exception was in place.

REGRESSION RESULTS

We conducted regression analyses to establish factors correlated with depositors' decision to run on their bank. Our results identify several characteristics of depositors and deposit types consistently associated with more (or less) stable funding across the three banks. Our results also suggest that the decision of individual depositors to stay or run is not fully explained by observables and, perhaps reflecting the banks' unique business models and deposit bases, run behavior differs somewhat across banks.

The main regression analysis examined characteristics of depositors with positive balances on Monday, March 6, and the propensity to run by Friday, March 17.[66] We estimated the regressions separately for each bank, allowing the models to distinguish depositor behavior across the banks that might arise from differences in bank business models or depositor bases. We also estimated the regressions separately for natural persons (i.e., consumers or households) and corporate entities (i.e., businesses, excluding entities affiliated with the banks) in each bank because we expected that a given factor might differentially affect the decision-making processes of households and businesses.[67] Finally, reflecting the fact that FRB remained a live bank through April, we conducted the same regression analysis for FRB during the last week of April. In each of the resulting regressions, we controlled for the following explanatory variables, which we grouped into three broad categories for easier discussion:

- Nature of relationship
  - Depositor tenure
  - Depositor's number of deposit accounts
  - Indicators for the maturity profile of the depositor's accounts (i.e., non-maturity accounts only, maturity only, or both)
- Scale of relationship
  - Share of uninsured deposits
  - Indicator for being a top depositor
- Characteristics of the depositor
  - Indicator for being a business in the digital asset sector
  - Among business accounts, an indicator for those owned by small businesses[68]
  - Indicators for the types of accounts a depositor owns (following the categorization scheme presented above: business, consumer nonretirement, etc.)

[66] In addition to these baseline regressions featuring a binary dependent variable (indicating whether a depositor either did or did not run, as defined previously), we also tested regressions explaining the share of a depositor's March 6 balance that they had withdrawn by March 17 (whether or not the depositor had run). The results were consistent between the two approaches.

[67] See Appendix C for additional details on our regression analysis. Note that we also ran separate regressions for corporate entities affiliated with the banks (i.e., parent, affiliate, and subsidiary firms) and governmental entities. We do not report the results of those additional regressions here, as the small samples prevented conclusive analysis. Nonetheless, we excluded affiliated entities and governments from the consumer and business regressions, as we expected their behavior to differ.

[68] As mentioned previously, we defined a small business as an entity that had $1.5 million or less in business-related deposits on March 6. Business-related deposits were business deposits, employee-benefit plan deposits, active escrow deposits, and passive escrow deposits.

REGRESSION RESULTS FOR BUSINESS DEPOSITORS

We focused first on results for the three banks' business (corporate entity) depositors in March. As a baseline for assessing the economic significance of our estimated effects, 40 percent of business depositors at SVB, 24 percent at SBNY, and 15 percent at FRB ran between March 7 and 17.

We found that the scale of the depositor relationship (defined above) tended to have the strongest correlation with the decision to run; in short, larger and less-insured depositors were more likely to run.[69] Unsurprisingly, a business depositor with uninsured deposits was significantly more likely to run than one with fully insured deposits.[70] In fact, the effect of having any uninsured funds ***at all*** was comparable to or larger than the reduction in run propensity from having a long depositor relationship. Depositors with three-quarters or more of their funds uninsured were roughly twice as likely to run as the baseline run rates listed above. Similarly, being a top depositor at the bank also had a large effect on the run propensity of depositors at SVB and SBNY, even after accounting for the uninsured share of their deposit balance. The increase in the propensity to run from being a top depositor for SVB and SBNY was similar to having more than half of deposits uninsured, though the specific magnitude varied between the two banks.[71] Note that top depositors, by virtue of their large deposit balances, often had substantial uninsured balances (passive escrow accounts notwithstanding). The effects of insurance coverage and top depositor status were additive in our models; thus, our regressions predicted that top depositors whose accounts lacked pass-through coverage were particularly likely to run on the bank.

Our results indicated that the nature of the relationship between the depositor and the bank (defined previously) was predictive of run probability, though the magnitude of the effects was generally smaller than the increase in the propensity to run associated with having uninsured deposits or being a top depositor.[72] For example, we found that longer deposit relationships reduced businesses' probability of running, although this reduction was, at most, around a third of the mean run rate across banks. A business depositor that had an account open for one to four years was as much as a few percentage points less likely to run than one whose oldest account was less than a year old. A customer with a deposit relationship of more than four years and up to seven years was less likely to run by a further few percentage points. Additional reductions in run probability associated with increased tenure appeared to diminish as relationships grew beyond 7 years.

Similarly, the predicted run propensity of a business depositor decreased in the number of open deposit accounts the depositor had at the bank. Across all three banks, a customer with four or more separate deposit accounts in the same bank was less likely to run than a customer with only one account. The reduction was roughly half of the mean run rate across the three banks, though this effect may reflect other characteristics of businesses that lead to multiple accounts and a lower run propensity that were not fully captured in other controls.

[69] We did not directly control for depositors' total deposit balances in these regressions because total deposit balances were highly correlated with uninsured balances. For econometric reasons, we therefore excluded total balances to accurately estimate the association between uninsured amounts and run propensity.

[70] Other empirical studies that use comparably granular data find a similar stabilizing effect of deposit insurance in various economic environments. See, for example, Martin, Puri, and Ufier (2026); Iyer, Jensen, Johannesen, and Sheridan (2019); Iyer and Puri (2012); and Davenport and McDill (2006).

[71] Given the very different concentration of top depositors across banks, some variation in results here is to be expected.

[72] Martin et al. (2026); Brown, Guin, and Morkoetter (2020); and Iyer and Puri (2012) provide complementary empirical evidence that more intense bank-depositor relationships attenuate depositors' run propensity. Iyer, Puri, and Ryan (2016) study a bank in India and similarly find that depositors with longer tenure are less likely to run; adding more texture, though, they also find that deeper relationships (such as depositors who also have a loan from the bank) make depositors better able to distinguish rumors from true bank distress, resulting in differential run behavior across crisis contexts.

We also found that business customers with term deposits had a lower predicted propensity to run than customers with only nonmaturity deposits. However, some caution should be taken in interpreting this finding since maturity deposits held by businesses were a comparatively small share of deposits at all three banks.

Finally, we included controls for a variety of indicators that reflected the characteristics of the depositor. For example, SBNY and, to a lesser extent, SVB had material deposit volumes from firms associated with the digital asset industry. These depositors were significantly more likely to run on both banks; for SBNY, the effect was particularly large and exceeded the impact of being a top depositor. In contrast, the indicator for small businesses had the opposite effect on run propensity, but a comparatively small magnitude. Small businesses were typically a few percentage points less likely to run than larger businesses, an effect similar in magnitude to having multiple deposit accounts.

REGRESSION RESULTS FOR CONSUMER DEPOSITORS

On average, consumers (i.e. natural persons) were slightly less likely to run than businesses. But indicators for the scale of the depositor relationship still had the strongest association with run probability and were similar to or higher than for businesses. Thus, controlling for other factors, consumers appeared even more sensitive to insurance status than businesses; the effect on run propensity of being uninsured was greater for consumers than for businesses.

Our analysis indicated that the nature of the depositor relationship was notably less predictive for consumers than for business entities. Estimates of the effect of depositor tenure on run probability were often not statistically significant and the estimated effects were consistently close to zero. The effect of the number of accounts was inconsistent across banks, perhaps suggesting differences in the consumer depositor bases of the banks. As was true for businesses, consumer depositors who owned CDs were generally less likely to run.

Finally, we analyzed the determinants of run behavior of FRB depositors in the last week of April, just before the bank failed. We again ran separate regressions for businesses and consumers. In summary, the qualitative results from the March regressions (discussed above) continued to hold for FRB depositors in April. But coefficient estimates were generally smaller than in the corresponding March regressions. A few reasons may explain why depositor behavior in April differed from that of March, especially why depositors would be less responsive, including that less stable depositors may have already left the bank during the March runs, such that only "stickier" or less attentive depositors remained.

CONCLUSION

The runs at SVB, SBNY, and FRB were substantially faster and larger than previous runs. In just three business days, SVB and SBNY lost half of their deposits while FRB lost just under half of its deposits. The share of deposits lost by each bank in three business days dwarfed deposit outflows from large bank runs in the past, such as those at Continental Illinois, Washington Mutual, and Wachovia.

We estimated that at most, 76 percent of SBNY's deposits were uninsured as of year-end 2022. This estimate, while still very high compared with other banks, is substantially lower than the publicly reported uninsured share of 90 percent.

Our results show that deposit insurance is stabilizing. We found that fully insured retail deposits, which were held by the vast majority of depositors at each bank, did not run, and in fact increased at SVB and FRB between March 7 and March 17. At SBNY, these deposits initially increased and then returned to the March 6 level by March 17. In addition, we found deposit insurance coverage to have the largest effect on the propensity of a depositor to run on one of these banks among all the factors included in our regressions.

Our findings also suggest that considerations other than deposit insurance are important, particularly for some types of deposits and for large depositors. Passive escrow deposits, which we assumed to be fully insured from pass-through insurance coverage, fell by 56 percent at SBNY between March 7 and March 17.

Deposit outflows were substantial during the operation of the SVB and SBNY bridge banks. SVB lost 40 percent of its March 6 balance during the first week of Silicon Valley Bridge Bank. SBNY lost 37 percent of its March 6 balance during the week that Signature Bridge Bank operated. These outflows occurred after invocation of the systemic risk exception that extended full deposit insurance coverage to all deposits at both banks. The extension of full deposit insurance coverage may have prevented even greater deposit outflows, but the continued runs suggest that other factors, such as depositor uncertainty about how and when SVB and SBNY would exit the bridge banks, impacted depositor behavior.

In addition, the largest depositors at all three banks were significantly more likely to run. In our regressions, being a top depositor substantially increased a depositor's propensity to run, even after accounting for the uninsured share of their deposit balance and other factors. We found that the vast majority of top depositors that ran at both SVB and SBNY did so during the operation of the bridge banks.

Finally, we found that at all three banks, business depositors that ran between March 7 and March 17 mostly withdrew all or almost all their balances from business operations accounts that held business deposits, leaving very little or nothing behind. We found the same withdrawal patterns for business operations accounts that held passive escrow deposits.

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APPENDIX A
Glossary

Business deposits:
Deposits in accounts owned by businesses (including nonprofit organizations but not governmental entities) where the business is the beneficial owner of the funds.

Consumer deposits:
Deposits owned by consumers and held in nonretirement accounts.

Depositor:
An account owner. A depositor's associated deposits are the total deposits across all accounts the depositor owns.

Financial Companies:
Banks and other insured depositories, any subsidiaries or affiliates of banks, investment advisors and broker/dealers registered with the Securities and Exchange Commission, hedge funds, private equity funds, and insurance companies.

Retail fully insured deposits:
Consumer deposits in retirement and nonretirement accounts, business deposits of small businesses, estate deposits, and trust deposits fully insured on March 6, 2023, and for which the retail depositor was also the beneficial owner.

Run:
When a large number of depositors simultaneously withdraw their deposits from a bank due to fears that the bank might fail. This study considered a depositor to have run on a specific day during the period March 7 to March 24 if the end-of-day balance for that depositor (including all deposit types in accounts owned by that depositor) was 25 percent or less of their March 6, 2023, balance. In other words, the depositor had withdrawn 75 percent or more of their March 6, 2023, balance. A depositor could run only once: the day in which their end-of-day balance first met the run threshold. Run behavior at FRB was also analyzed during the period April 25 through April 28; the reference balance used was each depositor's April 24 balance.

Small Business:
An entity with $1.5 million or less in business-related deposits on March 6, 2023. Business-related deposits in this study were business deposits, employee-benefit plan deposits, active escrow deposits, and passive escrow deposits.

Third-party placed, pooled, active escrow deposits (or active escrow deposits):
Deposits placed by a business (i.e., the third party) not affiliated with the bank in pooled accounts that hold commingled funds belonging to multiple beneficial owners. The beneficial owners of the funds more than likely can withdraw their money from the business (and therefore, indirectly, the bank) on demand.

For this study, these deposits were primarily customer funds of investment-related companies, including companies that facilitate investment in digital assets, and customer funds of banking-as-a-service financial technology firms. These accounts also could include sweep accounts and other types of cash management accounts.

Third-party placed, pooled, passive escrow deposits (or passive escrow deposits):
Deposits in accounts owned by a business (the third party) not affiliated with the bank and containing commingled funds belonging to multiple beneficial owners in a single pooled account. For this study, these deposits included mortgage servicing escrows, apartment security deposits, and Interest on Lawyer's Trust Accounts (IOLTAs) that generally hold attorney client funds that are nominal in amount or held for a short time. The beneficial owners of the funds in these pooled accounts generally could not withdraw their funds from the business (e.g., the apartment management company) on demand. The beneficial owners of the funds therefore could not (indirectly) withdraw their deposits from the bank on demand, although the third-party business that owned the account may have been able to do so.

Top depositors:
The top 0.5 percent of depositors at each bank, ranked by their total deposits as of March 6, 2023.

This study separately ranked FRB depositors using their April 24, 2023, balance.

For the top depositor designation, all deposits of a depositor, regardless of the type of deposit, were summed. For example, if a business had a business account with $500,000 and a pooled passive escrow account with $30,000, then that depositor had a total of $530,000 in deposits at the bank.

APPENDIX B
Data and Deposit Type Classification

Data collected by the FDIC when a bank fails served as the primary source for this analysis. These data came from core systems of the failed banks with information on customers, balances, transactions, and wire transfers for a period of time before and, in some cases, after failure. The length of historical and post-failure data available varied by bank.

We looked for relevant data necessary to conduct all parts of this analysis, cleaned the data, and constructed analysis-ready tables and benchmarked to existing external sources, such as Call Reports and other existing reports, to ensure reliability. As part of this process, we used information on customers, customer relationships to individual accounts, account titles, and other bank-internal account descriptors to identify distinct depositors, types of deposits, and their behavior during the run.

The basic processing steps involved classifying accounts, linking them to depositors, and estimating deposit insurance coverage.

Throughout our analysis, a depositor was defined as an account owner, and their associated deposits were the total deposits across all accounts they owned.[1] The deposit insurance estimate was, to the extent possible, based on the deposits of individual beneficial owner(s).

For each account, we attempted to identify the owner(s) of the account and the beneficial owner(s) of the funds, typically by their U.S. tax identification number. We classified the accounts using a combination of information related to the account and by identifying key words occurring in the account title and depositor names, such as "for benefit of," suggesting that the account owner was not the beneficial owner(s) of the funds, and "profit sharing plan," which indicated an employee benefit plan. We combined information on the deposits held in accounts under various deposit insurance categories with their beneficial owners to estimate deposit insurance coverage. The resulting analysis table contained information on the daily total and insured deposits belonging to a given entity (person or business) either as the beneficial owner or as an account owner.[2]

One key decision in our analysis was the choice of deposit types. We classified all deposits at the three failed banks into 23 categories that served as a basis for our analysis and deposit insurance estimation.[3] We developed our approach to classification with two broad goals in mind.

First, the categories needed to be consistent with our approach to deposit insurance estimation. Deposit insurance is a critical feature to consider during a bank run, so our categorization scheme broadly aligned with deposit insurance ownership categories, otherwise known as "rights and capacities."[4]

[1] This definition of depositor aligns with the notion of ability to withdraw deposits and close accounts during a run. In many cases, the depositor was the beneficial owner of the deposits they controlled. However, the depositor and beneficial owner were distinct in the case of escrow and custodial accounts; in such cases we identified the agent or custodian as the depositor. In other cases, particularly joint consumer accounts, there may have been multiple depositors and beneficial owners associated with the same deposit account.

[2] A firm acting as an agent on behalf of many customers may have been the account owner of a large amount of deposits without having been the beneficial owner of any. Accordingly, the deposit insurance coverage for those funds controlled by that firm depended crucially on the allocation of funds across their beneficial owners.

[3] See Appendix C for details of our deposit insurance estimation.

[4] FDIC deposit insurance coverage is provided for funds held in different rights and capacities (or ownership categories). All deposits in a particular ownership category — whether in one account or multiple deposit accounts — are aggregated and insured up to the Standard Maximum Deposit Insurance Amount (currently $250,000) for that ownership category. See General Principles of Insurance Coverage | FDIC.gov.

Second, we wanted the deposit types to allow for analysis of deposit behavior of various types of depositors or beneficial owners of interest that may differ along multiple dimensions that could affect run propensity, such as different types of incentives, differences in information, and ability to withdraw funds directly from the bank. For example, for depositors with pooled escrow deposits, the amount of control beneficial owners of funds have over their funds may matter to the account owner/depositor when they are making decisions when the bank is under stress. Accordingly, when account information indicated that beneficial fund owners had little direct control over their deposits, such as with mortgage servicing and apartment security deposit escrow deposits, we categorized the deposit as "passive" pooled escrow. In contrast, if the beneficial owners could have had substantial control over their deposits held by the depositor, we classified the deposit as "active" pooled escrow; examples include customer deposits held in escrow by investment companies, financial technology companies, and digital asset trading platforms that comingle trading account funds of their clients.

Following are the 23 categories into which we classified deposits:

- Consumer nonretirement
- Consumer retirement
- Trust
- Estate
- Business
- Employee benefit plan
- Government
- Third-party placed, pooled, passive escrow
- Third-party placed, pooled, active escrow
- Third-party placed, brokered CDs
- Third-party placed, guardian
- Third-party placed, single owner of funds
- Third-party placed, multiple owner of funds
- Third-party placed, other
- Bank-owned account, custodial/escrow, single owner of funds
- Bank-owned account, custodial/escrow, multiple owners of funds
- Parent-owned account, parent's own funds
- Subsidiary-owned account, subsidiary's own funds
- Subsidiary-owned account, custodial/escrow, single owner of funds
- Subsidiary-owned account, custodial/escrow, multiple owners of funds
- Affiliate-owned account, affiliate's own funds
- Affiliate-owned account, custodial/escrow, single owner of funds
- Affiliate-owned account, custodial/escrow, multiple owners of funds

For estimating insurance coverage, it is important to determine the number of beneficial owners; hence, we separated custodial and escrow accounts into single-owner, where we knew the number and identity of the beneficial owner, and multiple-owner (pooled) escrow accounts, where we did not.

APPENDIX C
Estimation of Deposit Insurance Coverage

We estimated deposit insurance coverage by aggregating deposits across all accounts of the same deposit insurance ownership category that were owned by the same depositor.[5] For example, if bank records listed three accounts with the same business (identified by the same Employer Identification Number) as both the account owner and the beneficial owner of funds, then the balances in those three accounts were the amount of business deposits held by that business, and any funds in excess of the deposit insurance limit of $250,000 were uninsured. If that same business also had an employee benefit account, which is a separate deposit insurance category, we estimated deposit insurance coverage separately for those deposits.

At each bank, we excluded from our analysis all accounts for which the bank itself was the beneficial owner of funds, and those accounts were therefore also excluded from the deposit insurance estimation.[6] Foreign office deposits were similarly excluded from our analysis.

For **business deposits**, we summed balances in all accounts owned by the same depositor and designated as uninsured any amount above $250,000. We did the same with **government deposits**; deposits for which the beneficial owner was an **affiliate, a subsidiary**, or the **parent** of the bank; and **deposits of estates**.

Third-party placed, pooled, passive escrow accounts (hereafter passive escrow accounts) were placed by a business not affiliated with the bank and held commingled funds from many beneficial owners. If relevant titling and recordkeeping requirements were met, deposits in these accounts would be insured on a pass-through basis to each beneficial owner.[7] We did not have information about the number of beneficial owners of the funds in each of these pooled accounts, how much each beneficial owner had in these accounts, and whether the beneficial owners had other accounts at the bank. But we assumed that all passive escrow deposits were fully insured.[8]

Passive escrow deposits at SBNY were primarily composed of mortgage servicing accounts (which could hold principal and interest payments or payments for taxes and insurance), accounts that held funds from IRS Section 1031 exchanges,[9] Interest on Lawyers' Trust Accounts (that held client funds), and accounts that held apartment security deposits. Only SBNY had significant shares of passive escrow deposits.

For most of the sources of funds that made up passive escrow deposits at SBNY, we considered it unlikely that a beneficial owner would have had more than $250,000 in these commingled deposits. At SBNY, the beneficial owners of funds from IRS Section 1031 exchanges of investment and business property likely would have had more than $250,000 per beneficial owner. For parsimony, and because funds from Section 1031 exchanges accounted for only 18 percent of total third-party placed, pooled, passive escrow deposits at SBNY, we assumed full coverage with pass-through insurance for these funds as we did with the other sources of funds in these commingled deposits at SBNY.

[5] We used the FDIC's "Financial Institution Employee's Guide to Deposit Insurance," updated April 1, 2024, as a reference for our estimation.

[6] Funds owned by the bank for its own operations are not liabilities of the bank and are not deposits.

[7] See information about pass-through deposit insurance coverage at https://www.fdic.gov/financial-institution-employees-guide-deposit-insurance/pass-through-deposit-insurance-coverage.

[8] We assumed that relevant recordkeeping and titling requirements for obtaining pass-through deposit insurance coverage were met and that the total balance of each beneficial owner was below $250,000.

[9] IRS Section 1031 addresses tax deferrals for like-kind exchanges of investment and business property. See 2023 Instructions for Form 8824.

Third-party placed, pooled active escrow accounts (hereafter active escrow accounts) also held commingled funds from many beneficial owners and accounted for large shares of total deposits at SBNY and FRB. Deposits in these accounts at SBNY were primarily composed of customer funds in investment-related companies, including companies that specialize in facilitating investment in digital assets, and customer funds of banking-as-a-service financial technology companies. These deposits could have included sweep accounts and other types of cash management accounts. At FRB, these deposits consisted of customer funds of investment-related companies, including money market funds, in sweep accounts or other types of cash management accounts. As was the case for passive escrow accounts, we did not observe the beneficial owners of (or their financial interests in) active escrow accounts.

The FDIC's 2011 "Study on Core Deposits and Brokered Deposits" describes sweep processes commonly used by investment companies in which customer funds were swept into a series of banks and the balances at each bank were usually fully insured.[10] We had no information on whether investment companies that facilitated investment in more specialized assets, including digital assets, used similar sweep processes that resulted in balances at each bank being fully insured. Nor did we have information on the customers of these investment firms and banking-as-a-service financial technology companies that might inform an estimate of deposit balances, such as whether they were primarily consumers or businesses.

Given the nature of these accounts, a small number of beneficial owners may have held amounts well in excess of $250,000. To avoid incorrectly identifying funds as insured when in fact they were uninsured, we did not assume full coverage from pass-through deposit insurance for active escrow balances. Instead, we treated each pooled account as an independent claimant, such that for each account, any funds over $250,000 were deemed uninsured. This approach implicitly assumes that there is only one beneficial owner of funds per pooled account. Our estimates therefore provided an upper bound on the share of active escrow deposits at each bank that could be uninsured.

Brokered CD accounts also held commingled funds from many beneficial owners. A primary attraction for investors of brokered CDs, compared with alternatives such as money market funds, is deposit insurance coverage. We assumed that all brokered CD deposits were fully insured from pass-through insurance coverage.

Employee benefit plan accounts also held commingled funds of many beneficial owners, which were the employees of the companies that owned the accounts. We assumed that all employee benefit plan deposits were fully insured from pass-through insurance coverage.

We also assumed that **bank-owned** and **subsidiary-owned escrow accounts** that held **pooled funds for many beneficial owners** were fully insured from pass-through deposit insurance coverage. The one exception is the account SBNY used to facilitate Signet transactions, which appeared to contain funds from sources similar to those in active escrow accounts. We therefore estimated deposit insurance using a similar method and deemed any funds over $250,000 to be uninsured.

Trust deposits are insured for $250,000 per eligible beneficiary, up to a maximum of $1.25 million if there are five or more eligible beneficiaries.[11] We did not have information regarding the number of beneficiaries of trusts. To avoid incorrectly identifying funds as insured when they were uninsured, we assumed each trust had only one beneficiary. We summed deposits in all accounts owned by the same trust and assumed deposit insurance coverage of $250,000. Any amount of deposits above $250,000 owned by the same trust was designated as uninsured. Our estimates provide an upper bound on the uninsured share of trust deposits at each bank.

[10] See FDIC, "Study on Core Deposits and Brokered Deposits," July 8, 2011.

[11] See the section on Trust Accounts in the FDIC's "Financial Institution Employee's Guide to Deposit Insurance."

Custodial accounts with a single beneficial owner of funds at the three banks included accounts that were **third-party placed, bank-owned, subsidiary-owned, or affiliate-owned**. A comprehensive deposit insurance determination would include all funds of the beneficial owner, including accounts held by the same or other third parties and accounts held directly at the bank. Our ability to reliably identify the beneficial owner(s) of custodial accounts and link them to other accounts varied considerably across the three banks. To maintain consistency, we treated each custodial account with a single beneficial owner of funds as an independent claimant, such that for each account, any funds over $250,000 were deemed uninsured. These deposit types were not among the most prevalent types of deposits at the three banks.

For **consumer deposits**, we summed deposits in all **individually owned accounts** for each depositor and designated as uninsured all deposits above $250,000. For SVB and SBNY, we also summed all deposits in **joint accounts** for each depositor and applied the deposit insurance limit of $250,000 per joint owner. For example, if two individuals jointly owned a checking account, a savings account, and a CD, we summed the deposits in all three accounts and designated deposits above $500,000 as uninsured. We did not prorate coverage for individuals on two or more joint accounts that varied in the set of co-owners. We treated these individuals as separate claimants such that an individual brought $250,000 of coverage for deposits held in the joint accounts with each unique set of owners rather than $250,000 to all joint accounts collectively. Very few depositors held joint accounts with different co-owners.

For consumer deposits at FRB, we were able to identify joint accounts but did not observe the number of depositors in each joint account. We applied a deposit insurance limit of $500,000 to each joint account. Any amount above $500,000 was deemed uninsured. Our estimates provide an upper bound on the uninsured share of consumer deposits in joint accounts at FRB.

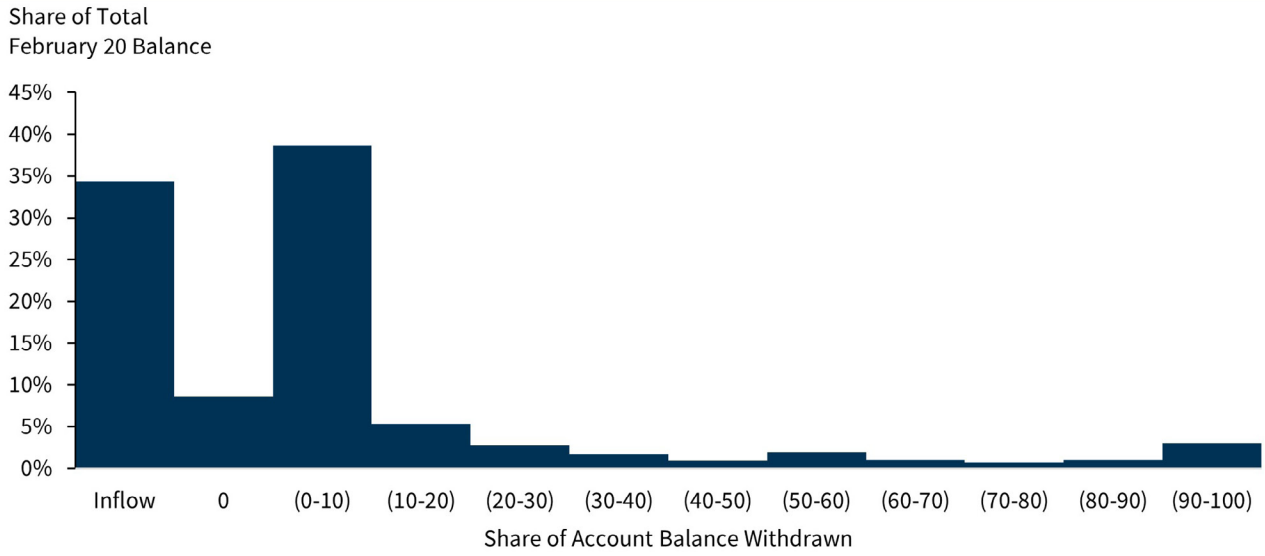
For **consumer retirement deposits**, we summed deposit balances for each depositor and designated as uninsured all balances above $250,000.

APPENDIX D

Business Operations Account Balance Changes Before the Stress Period

Chart D1

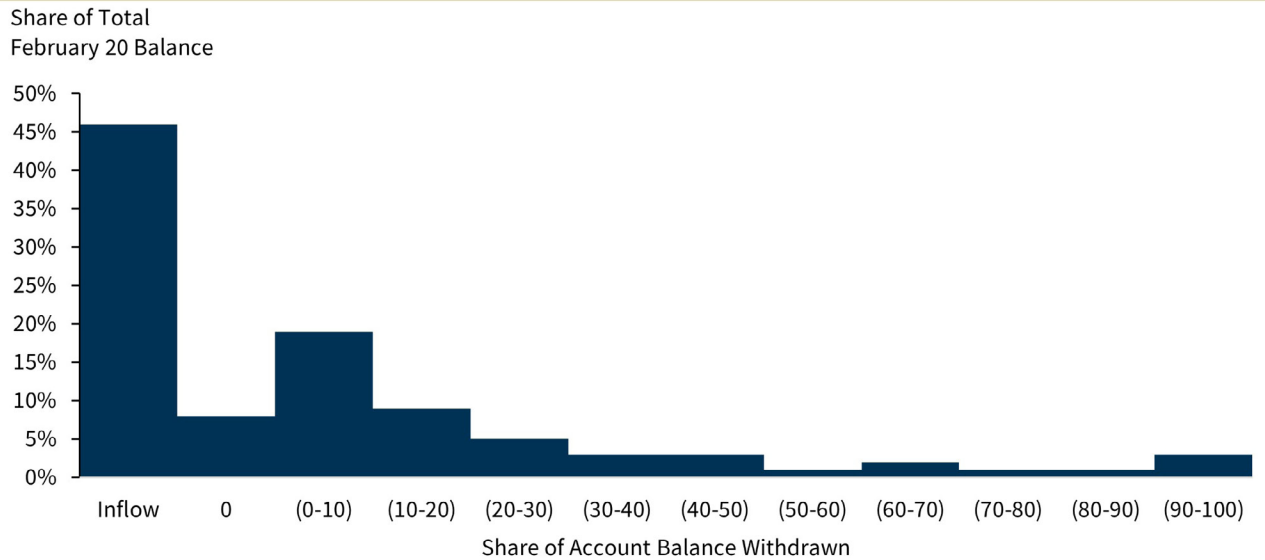
Silicon Valley Bank - Share of Balances Withdrawn from Business Accounts Owned by Depositors That Had Run by March 17



Note: The chart shows share of balances withdrawn between February 21 and March 3.

Chart D2

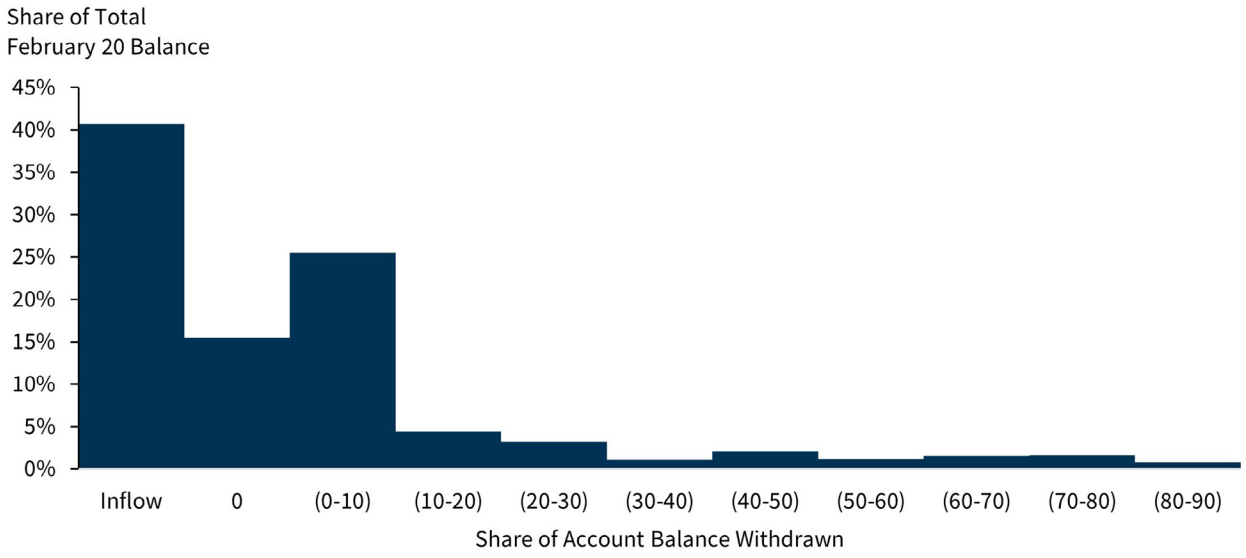
Signature Bank - Share of Balances Withdrawn from Business Accounts Owned by Depositors That Had Run by March 17



Note: The chart shows share of balances withdrawn between February 21 and March 3.

Chart D3

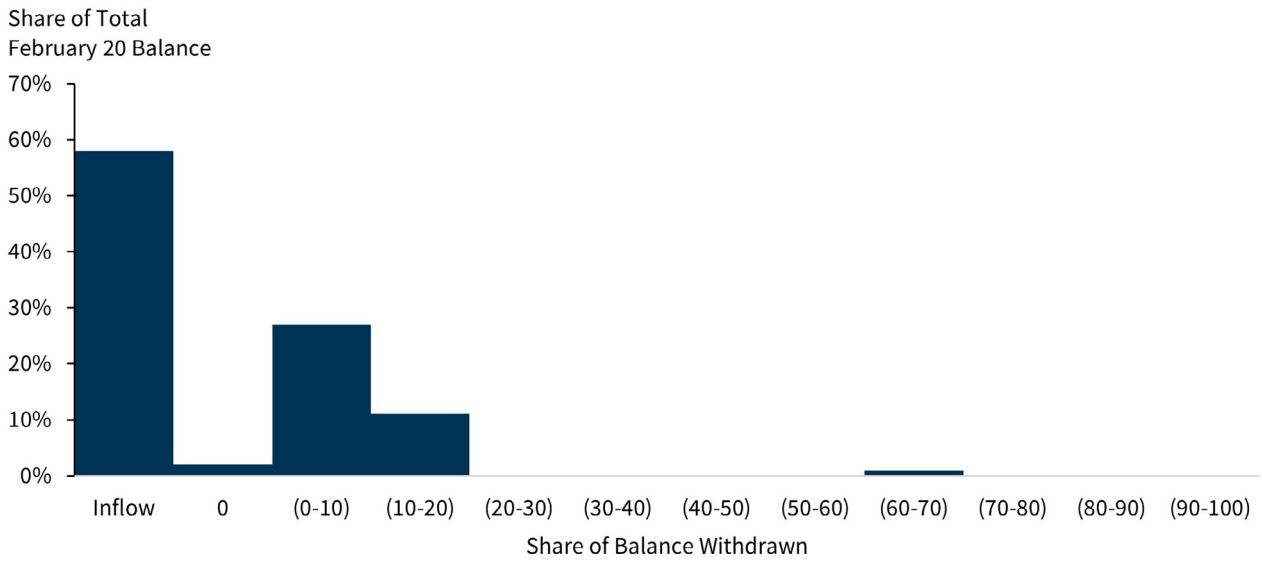
First Republic Bank - Share of Balances Withdrawn from Business Accounts Owned by Depositors That Had Run by March 17



Note: The chart shows share of balances withdrawn between February 21 and March 3.

Chart D4

Signature Bank - Share of Balances Withdrawn from Passive Escrow Accounts Owned by Depositors That Had Run by March 17



Note: The chart shows share of balances withdrawn between February 21 and March 3.

APPENDIX E
Regression Analysis Details

The regression analysis showed how various factors affect the probability that a depositor ran holding all other factors constant. The outcome in the main regression specification was a binary indicator for whether a depositor ran between March 7, 2023, and March 17, 2023, defined as whether their end-of-day balance (across all accounts) in that period ever fell to 25 percent or less of their March 6, 2023, balance. The universe for the regressions was the set of depositors that had a positive balance on March 6, 2023 (and therefore could run). For FRB, we repeated a similar regression specification assessing depositors present at the bank on Monday April 24, 2023, that ran by end of the week; the FDIC was appointed receiver of the bank the following weekend. Note that more than one depositor may represent the same account, such as in the case of joint consumer accounts, and a depositor may not be the beneficial owner of any money they represent, such as in the case of business escrows and third-party guardian accounts.

We ran separate regressions for each bank to isolate relevant features of their deposit base. Explanatory variables were defined at the depositor level, such as the length of their deposit relationship, the number of accounts they held, whether they had maturity accounts, and the percentage of their funds that were uninsured. These variables were divided into categorical indicators to allow for nonlinear relationships between depositor characteristics and the propensity to run. Tables A1 and A2 present the full set of categorical variables and selected summary statistics.

To maximize comparability across the three banks, we divided the data into two subsets of depositors. The first subset focused on corporate entities and the second focused on natural persons. This approach helped remediate the substantively different composition of deposit types at the three banks by comparing relatively similar groups that broadly aligned with how banks and their regulators model liquidity stress events. The sample of corporate entities consisted of all depositors that, on March 6, 2023, had positive balances in at least one account of the following types: business; employee benefit plan; passive escrow; and active escrow. The sample of natural persons consisted of all depositors who had positive balances in at least one account of the following types: consumer, consumer retirement, trust, estate, and third-party-placed, guardian. A natural person may have had a business account and a consumer account and therefore would appear in both subsets. Similarly, a trust with a trust account held by a natural person may have owned a business with a business account and thus appear in both subsets. The purpose was not to divide the data but rather to group depositors that might plausibly exhibit similar behavior.

We identified corporate entities involved in the holding and trading of digital assets to assess whether these depositors behaved differently from other businesses. These firms were identified either by researching the firm or looking for certain key terms in account titles that indicated the balances may have been used in ways related to digital assets. For example, Signature Bank operated Signet, which was a real-time payments platform based on blockchain technology. Firms that wanted to settle transactions on the platform were required to have an account at Signature Bank, leading to many firms having an account with "SIGNET" in the account title. Examples of other key terms were "BITCOIN," "STABLECOIN," and "CRYPTO." We manually reviewed accounts with these key terms to reduce the occurrence of false positives. If a depositor had any account determined to be related to digital assets, then they were marked as a "digital asset sector depositor" for the purposes of the regression analysis. In practice, SBNY and SVB had a significant share of digital asset sector depositors, though only at SBNY did those depositors hold a substantial share of total deposits.

TABLE E1
Summary Statistics for Corporate Entities (Businesses)

	Share (SVB)	Share (SBNY)	Share (FRB, March 6th)	Share (FRB, April 24th)
% Uninsured = 0	64%	79%	80%	89%
% Uninsured >0 and ≤ 50	8%	8%	8%	7%
% Uninsured >50 and ≤ 75	8%	5%	5%	2%
% Uninsured >75 and ≤ 95	14%	6%	6%	2%
% Uninsured >95 and ≤ 99	5%	1%	1%	0%
% Uninsured >99	1%	0%	0%	0%
Tenure < 1 year	13%	15%	15%	19%
Tenure >1 and ≤ 4 years	42%	30%	44%	42%
Tenure >4 and ≤ 7 years	25%	21%	20%	19%
Tenure >7 years	20%	33%	21%	20%
Tenure Missing	0%	0%	0%	0%
Number Accts = 1	74%	68%	80%	75%
Number Accts = 2 or 3	23%	27%	16%	19%
Number Accts >3	3%	5%	4%	6%
Top Depositor	1%	1%	1%	1%
Digital Asset Sector	1%	1%	0%	0%
Small Business	78%	95%	94%	99%

Note: The share is the percentage of observations meeting the specified criteria. To reduce risk of disclosure of private information, the number of observations, regression coefficients, and other results are not reported. Percentages are rounded to the nearest whole percentage point; a value of 0 percent therefore need not mean there are exactly zero depositors in a particular category/bin. Percentages may not sum due to rounding.

TABLE E2
Summary Statistics for Natural Persons (Consumers or Households)

	Share (SVB)	Share (SBNY)	Share (FRB, March 6th)	Share (FRB, April 24th)
% Uninsured = 0	85%	85%	88%	91%
% Uninsured >0 and ≤ 50	6%	7%	7%	6%
% Uninsured >50 and ≤ 75	4%	4%	3%	2%
% Uninsured >75 and ≤ 95	4%	4%	2%	1%
% Uninsured >95 and ≤ 99	1%	1%	0%	0%
% Uninsured >99	0%	0%	0%	0%
Tenure < 1 year	13%	10%	15%	17%
Tenure >1 and ≤ 4 years	34%	23%	31%	31%
Tenure >4 and ≤ 7 years	22%	18%	23%	22%
Tenure >7 years	31%	48%	31%	30%
Tenure Missing	0%	0%	0%	0%
Number Accts = 1	51%	62%	67%	61%
Number Accts = 2 or 3	42%	31%	27%	29%
Number Accts >3	7%	6%	6%	10%
Top Depositor	0%	0%	0%	0%
Digital Asset Sector	N/A	N/A	0%	0%

Note: The share is the percentage of observations meeting the specified criteria. To reduce risk of disclosure of private information, the number of observations, regression coefficients, and other results are not reported. Percentages are rounded to the nearest whole percentage point; a value of 0 percent therefore need not mean exactly zero depositors in a particular category/bin. Percentages may not sum due to rounding.